ATION FOR RESERVATION OF WATER
in
THE YELLOWSTONE RIVER BASIN

Montana Fish and Game Commission

Helena, Montana
November 1, 1976

200

Jon E Decker-Hess

Form No. 610
(New 9/74)

APPLICATION No. 1781
(3/15/74; 3:30 P.M.)

STATE OF MONTANA
DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

APPLICATION FOR RESERVATION OF WATER

NOTE: Pursuant to Section 89-890, R.C.M. 1947, only the state or any political subdivision or agency thereof, or the United States or any agency thereof, may apply to the board to reserve waters for existing or future beneficial uses, or to maintain a minimum flow, level, or quality of water throughout the year or at such periods or for such length of time as the board designates. Pursuant to Section 89-8-107, R.C.M. 1947, the United States or any agency thereof may not apply for a reservation of water in the Yellowstone River Basin until the requirements of Section 89-8-105, R.C.M., are met.

(Please type or print in ink)

1. Name of applicant Montana Fish and Game Commission

   Mailing address 1420 East Sixth

   City or town Helena State Montana Zip Code 59601

   Home phone _____ Other phone 449-3186

2. Source of water supply Yellowstone River Basin

   a tributary of Missouri River

3. Use(s) to which reserved waters will be applied fish and wildlife

4. Amount of water necessary for the reservation as per attached statement
   (cubic feet per second and acre-feet per year)

5. Type of reservation:

   A. Waters will be reserved in stream for beneficial use without any diversion.
      Yes X No _____

   B. Reservation requires construction of a storage or diversion facility to exercise the beneficial use. Yes _____ No. X 1/

6. If a storate or diversion facility is necessary, the date by which reserved waters will be applied to a beneficial use unknown at this date
   (month and year)

THE APPLICANT CERTIFIES THAT THE STATEMENTS APPEARING HEREIN ARE TO THE BEST OF HIS KNOWLEDGE TRUE AND CORRECT.

Wes Woodgerd Secretary — November 1, 1976
Signature of applicant — Date

1/ Fox Lake reservation only might require diking to fully utilize reserved water.

(continued)

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Application for Reservation of Water - Continuation and Amendment

I

INTRODUCTION

Pursuant to Section 89-890, R.C.M. 1947, and Article II of the Constitution of the state of Montana which establishes that a clean and healthful environment is an inalienable right of Montana citizens, the Montana Fish and Game Commission hereby respectfully makes amended application for reservation of water and flows thereof in the Yellowstone River basin.

This is an amendment to an application for reservation of water in the Yellowstone River submitted to the Department of Natural Resources and Conservation by this applicant on March 15, 1974. The original application requested a reservation of water and flows thereof only in the Yellowstone River from the mouth of the Clarks Fork River to the North Dakota state line. This amended application is made necessary by the broadening of the object of legislative interest indicated by enactment of Section 89-8-103 to 89-8-111, R.C.M. 1947, since the date of the original application and by the promulgation of rules to implement these statutes. It requests reservation of water in the Yellowstone River and within certain of its tributaries located within the river basin from Gardiner near Yellowstone National Park, to the Montana-North Dakota state boundary.

Streamflows requested for the lower reaches of the river, in the original application, have been adjusted from the original request and application due to increased knowledge of the fish and wildlife resources and their requirements. Further, this continuation and amendment is necessary to meet requirements of Montana Administrative Code Rule 36-2.14R(1)-S1430 Application Content. There is no provision for meeting these requirements on the Department of Natural Resources and Conservation's application form number #610.

II

AMOUNT OF WATER NECESSARY FOR THE PURPOSE OF THE RESERVATION

The Montana State Fish and Game Commission, Department of Fish and Game, an agency of the state of Montana, requests, and applies for, instream reservation of water and flows thereof, during each year hereafter in the Yellowstone River basin, including the Yellowstone River and certain tributaries of the river, in amounts as indicated by stream or stream reach, and for the periods indicated for each of the respective streams set forth in the "Statement on Amount of Water Necessary for the Purpose of the Reservation" attached hereto and hereby made a part of this application.

III

THE PURPOSE OF THE RESERVATION

The purpose of the reservation herein applied for is to reserve waters, and flows therof, for existing and future beneficial uses and to maintain a minimum flow, level and quality of water during such periods throughout each year in order to attain and serve such existing and future beneficial uses as follows:

(1) for the benefit of the public for fish and wildlife uses; and
(2) for the benefit of the public for recreational uses.

The attainment and service of such uses are to:

(1) provide fish and wildlife habitat sufficient to perpetuate the diverse species comprising this natural resource at levels comparable to current existing levels;
(2) contribute to, and maintain a clean, healthful and desirable environment;
(3) to sustain high levels of water quality; and
(4) honor and support all existing water use rights.

IV

THE NEED FOR THE RESERVATION

A water right for instream beneficial use for fish and wildlife, and recreational uses may be obtained, under applicable statutes and rules, only by application for reservation and not by petition or application for permit. Without this reservation, beneficial uses provided by the Montana Constitution, and by law, cannot be met or maintained.

Existing water rights in the river basin will at all times be honored. If the reservations here requested are not granted and approved, any waters available over and above such existing rights will be vulnerable to future appropriations by permit. If these future appropriations are allowed to be executed in advance of, or without, the reservations here requested being established, the fish and wildlife resources will be permanently deprived of the waters so necessary for their healthy survival. It is readily apparent when realistically considered, that under our current laws and regulations, waters once allowed to be appropriated might well never again be available to reservation for fish and wildlife purposes. The need for an adequate reservation now is thus dictated.

Further, this reservation is needed for the continued preservation of fish and wildlife habitat sufficient to perpetuate the diverse species comprising this natural resource at levels comparable to current existing levels, for recreational uses which those resources provide, and for the attainment and service of those other purposes of this reservation.

The documentation for this need is found in the "Statement of the Need for the Reservation" and other statements attached to this application.

V

THE RESERVATION IS IN THE PUBLIC INTEREST

This reservation of water is in the public interest. The public benefits which will occur from the reservation are:

(1) continued perpetuation of the fish and wildlife resources whose very existence is in the public interest;
(2) prevention of the gradual depletion of streamflows currently enjoyed by the public for recreational uses;
(3) continued perpetuation of the fish and wildlife resources for current and future utilization by the public;
(4) maintenance of water quality which contributes to a clean, healthful environment for the citizens of the state and the nation; and
(5) contribution to the protection of and continued utilization of existing water rights.

The explanation of these public benefits, by economic and environmental beneficial and adverse effects is provided in the "Statement that the Reservation is in the Public Interest." Included therein is reference to state and federal legislation or policies which support fish and wildlife and recreational uses.

VI

SUPPORTING STATEMENTS

There are attached hereto, and made a part hereof, statements on the need for, amount of, and public interest of this requested reservation of water, including a concluding statement. These statements and attached appendices are presented in support of this application for reservation and to meet the requirements of the Montana Water Use Act and applicable rules thereunder in establishment of a reservation of water and flows thereof for fish and wildlife and recreational uses.

STATEMENT OF THE NEED FOR THE RESERVATION

A water right for instream beneficial use for fish and wildlife, and recreational uses may be obtained, under applicable statutes and regulations, only by application for reservation and not by petition or application for permit.

The need for a reservation of water in the Yellowstone River basin is brought about by the basic habitat requirements of all fish, wildlife and other living organisms that have through the long evolutionary process come to be totally dependent upon the natural flow of the Yellowstone River and its tributary streams.

The respiratory dependence of a fish population upon the presence of an adequate water body is obvious. But, of course, this is not the sum total of the matter. Not so obvious, perhaps, is the fishery's dependence upon an adequate material streamflow for:

1. maintenance of spawning and rearing areas
2. shelter
3. food sources which, in turn, depend on good and sufficient stream flow.

In all of these, not only is water quantity critical, but also good water quality.

The stream discharge, as influenced by channel configuration must necessarily meet the hydrologic requirements necessary to provide these factors. Stream discharge in conjunction with channel configuration comprises the only living space available to aquatic organisms in streams. Over the centuries, fish populations in the Yellowstone River basin have survived and become attuned to both flood and drought, and today within that same framework they sustain themselves at levels allowed by the natural limiting factors found within the extremes of their environment.

The requested water is needed to maintain fish habitat, aquatic insect and lower plant and animal life which sustain fish. The Yellowstone River and its tributaries are important fishing and recreation areas used by the people of Montana and the nation. The recreational use of these waters is an important outlet from day-to-day pressures and is important in the human experience on this planet and is recognized as worthy of protection by our water use statutes. The fish species which would be protected by this flow request contribute to the well being of the people of Montana and those visitors who come to enjoy the splendors Montana has to offer.

Need for the reservations herein requested is outlined above. It is contended that if the requested reservations from future use are not provided for, the deterioration of these interests is inevitable. The degree or rate of deterioration depends on the degree that these needs for reservations are ignored.

Realizing that other uses of water are necessary, application is not made for all the water which has historically sustained these organisms. This request is for that amount of water strenuously urged as being absolutely necessary to sustain the organisms without significant long-term reduction in quantity and quality thereof. Increased water withdrawals over existing levels will, in the long run, reduce availability of habitat and consequently reduce the number of organisms which can healthily occupy that habitat. There is a limit to the amount of water which can be removed from any stream channel without severely changing the quantity and quality of the aquatic species present.

All aquatic animals depend for their existence on lower forms of plants or other animals. These lower forms also have specific water requirements needed to grow and reproduce. Reduction in availability of lower aquatic forms ultimately reduce the number, health and well being of those organisms at higher trophic levels.

Reduced streamflows also affect the quality of water which is necessary to sustain these organisms. Possible consequences of reduced streamflow are higher water temperatures and increased amounts of dissolved solids. Thus, there are several ways reduced streamflow can adversely affect aquatic organisms: (1) reduction in the physical size or character of living space, (2) altering the food chain or reducing availability of food organisms, and (3) changing water quality which alters living conditions for plant and animal life. Thus streamflows must be protected from depletion to prevent loss of these habitat conditions which allow aquatic organisms to survive.

The Yellowstone River is a Class 1 or "blue ribbon" trout stream from Gardiner to Big Timber and was classified as such in 1959 and again in 1965 by the stream classification committee composed of representatives of the Montana Department of Fish and Game, Montana State University and U. S. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife. A blue ribbon stream is classified as a stream which has national as well as statewide value as a fishery. A total of 452 miles of streams was classified as "blue ribbon" in 1965. Of this total, the blue ribbon stream reach between Gardiner and the Boulder River at Big Timber represents the largest single reach (103 miles) of blue ribbon trout stream in Montana, and contains 23 percent of the state's blue ribbon waters. As stated in the introduction to the classification map, "A serious problem in the preservation of fishing streams is the measurement of the total worth of a fishery - economic as well as social. Recreational fishing does not readily lend itself to conventional means of measurement and as a result is often sold short in comprehensive planning that involves water resources."

The classification was an attempt to provide a base for calculating the material worth of the fishery resource and a guide to long-range policy, administration and management of the fishery resource. The classification shows rather clearly that Montana fishing streams are limited both in quantity and quality.

The Yellowstone River is unique in this nation in that it is one of the few remaining major "free-flowing" streams left in the continental

United States. The upper Yellowstone (upstream from the Boulder River) is characterized by its clean, cold, highly productive water. Its trout fishery in these upper reaches is renowned nationwide. It provides high quality fishing for rainbow, brown and Yellowstone cutthroat trout. The Yellowstone cutthroat is a unique species found only in the upper Yellowstone basin. Mountain whitefish are also abundant and provide an important winter fishery.

The Yellowstone River derives much of its water and bedload material from the mountain tributary streams. These creeks originating in high mountain areas contribute cold, high quality water to the Yellowstone. They also, themselves, support self-sustaining rainbow-cutthroat hybrid, brown and brook trout and mountain whitefish, which provide an important recreational fishery. The tributary streams are generally high gradient with cobble and boulder channels. Fish cover is provided primarily by water surface roughness, streambank vegetation and instream boulders.

Tributaries arising in the Absaroka Mountains include Bear, Cedar, Sixmile, Emigrant, Mill, Pine, Deep, Suce and Mission Creeks. Tributaries arising in the Gallatin Range and flowing east to join the Yellowstone include Mol Heron, Tom Miner, Rock, Big, Fridley, Eightmile, Trail and Billman Creeks. Fleshman Creek originates in the southern end of the Bangtail Ridge and joins the Yellowstone at the city of Livingston.

In addition to the mountain tributary streams, McDonald, Emigrant, Armstrong and Nelson Creeks are outstanding among several important spring-fed streams located in this area. The spring creeks are characterized by fairly constant flows and temperature, and are rich in aquatic vegetation and insect life. They derive their richness from the rich bottomlands of Paradise valley, through which they flow. The high productivity of the spring creeks is reflected in the excellent trout populations which they support (Elser and Marcoux 1971, Workman 1972 and 1973). Brown trout and rainbow trout are the dominant species. Fish cover consists primarily of streambank vegetation, undercut banks, debris and instream vegetation. In addition to resident trout populations, substantial numbers of rainbow and brown trout from the Yellowstone River use the spring creeks for spawning purposes (Berg 1975).

Waters in the Shields River drainage offer sport fishing for cutthroat, rainbow, brown and brook trout and mountain whitefish. Cutthroat and brown trout and mountain whitefish form the backbone of the fishery. Brown trout and mountain whitefish are most abundant in the Shields River mainstem below the headwaters basin, while cutthroat trout are mainly found in the headwaters basin and in the tributary streams.

Rainbow and brown trout are the most sought-after species in the upper Yellowstone and provide excellent angling opportunities. Although not native to the study area, they now provide the bulk of the trout fishery and harvest. The Yellowstone cutthroat is a highly prized native species, but it is by far the least numerous of the three trout species present today.

Yellowstone cutthroat trout spawning runs have been documented in 9 of 16 tributaries inventoried during a 3-year period (Berg 1975).

Streams with confirmed cutthroat runs include Cedar, Mol Heron, Tom Miner, Rock, Big, Mill, Emigrant Spring, McDonald Spring and Nelson Spring Creeks. No migratory cutthroat were found in Billman, Mission, Dry, Eightmile, Pine, Sixmile or Deep Creeks; however, limited sampling conducted on the latter tributaries does not allow the determination of the presence or absence of a cutthroat spawning run at this time.

Brown and rainbow trout spawning runs were found in 4 of the 13 tributaries in 1974 and 1975. Migratory brown trout were taken in the tributaries from early November through early December 1974, and rainbow were found from early April through early May 1975. Migratory brown and rainbow trout utilize only Armstrong Spring, Nelson Spring, McDonald Spring and Emigrant Spring Creeks for spawning. Some fish migrate several miles in an upstream or downstream direction in the Yellowstone River to reach a spring creek, then ascend it to spawn. The two native salmonid fish species, Yellowstone cutthroat trout and mountain whitefish, appear to be particularly dependent on the tributary streams for spawning (Berg 1975).

Mountain whitefish spawning runs were documented and monitored in 6 of the 13 tributaries. These included Mol Heron, Tom Miner, Big, Eightmile, Fridley and Mission Creeks. No migratory whitefish were found during limited sampling conducted on Rock, Cedar, Billman, McDonald Spring, Nelson Spring, Emigrant Spring and Armstrong Spring Creeks. In most streams where migratory whitefish were found, a large number of fish was involved in the run (Berg 1975).

Thus it is evident that the upper Yellowstone River and its tributaries are intimately related due to streamflow contribution and biological interchange between the tributaries and mainstem. The tributaries of the upper Yellowstone cannot be separated from the blue ribbon mainstem, and flow recommendations have been made accordingly.

The middle Yellowstone River (between the Boulder River and the Bighorn River) is a transition zone between the primarily cold water environment of the upper river and the warm water environment of the lower river. It contains fish species common to both the upper and lower river (below the Bighorn River). This stretch of the Yellowstone is classified as a class 2 ("red ribbon") stream from the Boulder River to the Sweet Grass-Carbon County line, a class 3 stream from the county line to Laurel and a class 4 stream from Laurel to the Bighorn. Only small amounts of aquatic resource data have been obtained on this stretch of the Yellowstone River and its importance may not yet be fully realized.

The upper portion of this stream reach of the Yellowstone is primarily salmonid habitat - the principal game species being rainbow and brown trout and mountain whitefish. Species change to channel catfish and sauger below the Clarks Fork of the Yellowstone.

The Boulder and Stillwater rivers are major tributaries within the reach. Both of these streams and their tributaries are important trout fisheries and are extensively used by Billings area residents.

The Clarks Fork of the Yellowstone River contains a trout fishery from its headwaters downstream to Belfry. Brown and rainbow trout, mountain

whitefish and an occasional cutthroat trout are found in this reach. Below this reach water quality is lowered by a high sediment content. This sediment affects trout habitat requirements; however, warm water species such as catfish and sauger are present. The Clarks Fork also contributes its flow quantity to the mainstem Yellowstone River and is therefore important in its effects on aquatic habitat downstream from their confluence. In addition, Rock Creek (near Red Lodge) and its tributaries and Bluewater Creek are important tributaries to the Clarks Fork and are important in their own right as trout streams and recreation areas. Their waters should be protected from depletion.

The lower Yellowstone River (below the mouth of the Bighorn River) contains a variety of fish commonly called warm water species. Little was known about this system until studies were initiated in 1973. Additional data have been obtained since then which indicate a unique and significant fishery exists for paddlefish, shovelnose sturgeon, sauger, walleye and channel catfish. Certain ecological relationships have been established for some of these fish which show that two of the Yellowstone's major tributaries - the Tongue and Powder rivers, are important components of their life cycles.

The Bighorn River has been regulated by Yellowtail Dam for about 10 years. During this period a significant, high quality, trophy trout fishery has developed from the Yellowtail afterbay dam downstream to approximately 10 miles below St. Xavier. Brown and rainbow trout are the principal species sought by anglers. The comparatively large size of these fish stimulates a great interest by Billings residents as well as fishermen from other areas. Little is known about the Bighorn below the salmonid reach. Channel catfish and sauger are known residents of this stream reach and it is possible that burbot and paddlefish may use the stream for spawning.

The Yellowstone River, under predevelopment conditions, had an estimated mean annual flow of between 11 to 12 million acre feet (MAF) (J. Dooley pers. comm.). The average annual discharge at Sidney for a 62-year period of record (1912-1974) was 9.47 MAF (USGS Surface Water Records for Montana 1974). Adjusted to the 1970 level of water depletion, the mean annual discharge at Sidney was calculated to be 8.8 MAF (NGPRP 1974).

It can be seen from the above figures that the Yellowstone is significantly depleted (20 to 27 percent) from its average virgin flow conditions. Aquatic organisms are limited primarily by the extremes in their environment. The prospect of additional water depletions, in view of the historic low flows experienced in the lower river during the period of record, is particularly disturbing. While the current level of water usage does not produce significant impacts during better than average water years, the effects of further depletions will be severe during natural extremely low water years or during prolonged drought periods.

In addition to waterfowl, riparian wildlife and furbearers, the lower Yellowstone supports a diverse and unique fish fauna. Fish species present range from the primitive paddlefish and sturgeons to the popular walleye,

sauger, channel catfish and ling. In addition there are a host of nongame species. To help assure their continued existence in their present abundance, it is necessary for the reservation to reflect flows which maintain their habitat as well as satisfy the requirements of various stages of their life history.

Paddlefish migrate up the Yellowstone River each spring to spawn. Observations in Missouri indicate that paddlefish migrate in response to water temperature, photoperiod and an increase in flow level (Purkett 1961). The Yellowstone paddlefish migration also occurs coincident with spring runoff (Robinson 1966, Rehwinkel 1975). Strength of the spawning run is associated with the duration of the seasonal rise, as well as the height of the rise. The increase in flow is necessary to trigger the run, allow passage of the migrant fish to the spawning areas and provide adequate spawning habitat (Vasetskiy 1971). The spring rise must be maintained in the Yellowstone to meet the reproductive needs of this paddlefish population and is thus included in the requested flow quantity.

Two populations of sturgeon, the shovelnose and pallid, currently inhabit the Yellowstone River. Life history information on these two species is extremely limited, however they also migrate and spawn during the spring high water period. Flows which assure paddlefish reproduction will also satisfy the sturgeon's requirements. Significant reductions in existing water levels may threaten the abundance of the shovelnose populations and possibly the very existence of the pallid, which is considered rare over most of its entire range.

In addition to satisfying the reproductive requirements of certain species of fish, the spring high water period also provides flows necessary for the major channel forming processes to occur. With insufficient high flows, the bedload movement necessary for formation of channel structures (islands, bars, pools, etc) would diminish and result in altered habitat conditions, both for aquatic and riparian populations. Deposition of silt in streams carrying a high sediment load greatly changes the environment for certain species of fish by blanketing portions of the streambottom, eliminating potential spawning areas and reducing the available food producing areas. Increased discharge associated with spring runoff results in flushing action which removes the deposited sediments. A discharge which results in an annual cleansing of the streambottom is an important aspect of the stream ecology, particularly for streams which transport large amounts of sediment like the lower Yellowstone.

The abundance of food in a river varies, depending on the production area. Riffles generally have the greatest food production (Hynes 1970) but also are the areas most severely affected by lowered water levels (Bovee 1974). Minimum flow recommendations should reflect physical conditions which would maintain quality aquatic food production. By ensuring that most of the stream substrate is wetted, maximum benthic production is maintained. By assuring good food production, rearing flows for sub-adult fishes are maintained as well as suitable growth rates for adult fishes.

Observations on anchor ice by Benson (1955) indicated that ice formed most commonly in stream sections possessing fast-flowing water, with a gradually decreasing volume of flow. Anchor ice serves as a method of dislodging and scouring of bottom insects, and could result in a loss of invertebrate production. Adequate flow must be maintained during the winter months to retard the formation of excess anchor ice and the subsequent total freezeup of the channel. Fish habitat conditions and needs during the critical low flow period of December through February are totally unknown. However, Chapman (1966) states that winter-regulated density of fish populations is probably related to space necessary to escape displacement or damage by current.

To protect the present water quality of the lower river, not only for aquatic life but also for municipalities and agriculture, adequate flows must be maintained. The flows recommended in this reservation will help assure maintenance of suitable water quality of the lower Yellowstone River (J. Thomas, 1976 - personal communication).

Water temperatures in the lower reaches of the river are approaching critical levels, with summer temperatures in the 80's common. Withdrawal of water during this season could alter the heat budget of the river, and may result in lethal temperatures for fish like sauger, northern pike, sturgeon and burbot, or for aquatic invertebrates or forage fish that support them. A study by the USGS is being conducted on flow/temperature relationships in an effort to define flow levels which will not raise water temperatures beyond limits stated in Montana Water Quality Standards.

In addition to species which live within the aquatic environment, a number of important terrestrial wildlife species are dependent upon the streams in the Yellowstone basin for life-sustaining needs.

Among the major migratory bird species that may be affected by reduced river flows are bald eagles, Canada geese, great blue herons, and several species of ducks. All of these birds use the river during at least a portion of the year for a variety of reasons, including resting, nesting, and/or feeding.

Spring migrant Canada geese arrive on the river sometime in March, depending on weather conditions. Up to 16,000 have been counted at one time on the river between Billings and the North Dakota border. Most of these geese stay along the river for only a short time before continuing their northerly migration, but a substantial number remain along the Yellowstone to breed. Nesting activities begin sometime in March. In 1975, there were an estimated 450 to 500 pairs of breeding Canada geese along the Yellowstone River in Montana.

As has been reported for Canada geese nesting along other rivers (Childress 1971; Dimmick 1968; and Ballou 1954), geese breeding along the Yellowstone prefer islands. Approximately 96 percent of 140 nests surveyed in 1975 and 1976 were on islands (Hinz 1976). They appear to prefer vegetation or other cover that allows them good visibility along with concealment. This type of site occurs on the upstream ends and sides of islands where ice scouring and high flows have reduced vegetation density.

There are several possible effects of reduced river flows on Canada goose nesting. An immediate effect of abnormally low spring water levels would be an increase in predation on goose nests as happened in the spring of 1976. Low flows decreased the width and depth of side channels which more readily permitted access of predators to nesting islands. Reduced winter flows might alter or eliminate ice scouring on islands, with the result that vegetation densities might increase to unacceptable levels for nesting. Also, a reduction in peak spring flows might alter the sediment and bedload material transport system to the point that no new islands are formed and vegetation encroachment takes place on older islands.

Fall goose concentrations on the Yellowstone River have been increasing since the mid-1960's. Recent surveys (1973-1975) indicate that up to 10,000 migrant geese stop along the river below Billings usually in November for varying periods of time. Reasons for this apparent increase in geese stopping along the lower river may be an increase in the amount of grain grown near the river and possibly an increase in the continental goose population.

Many geese remain on the river until it freezes over, usually between late November and the middle of December. Reduced river flows and lower velocities would probably hasten the onset of freeze up, which would shorten the duration of goose occupation of the river. This in turn would decrease the enjoyment derived from the presence of the geese by people who live in the region and by waterfowl hunters.

In 1974, 17.9 percent of the statewide goose harvest (all species) occurred in counties bordering the Yellowstone River.

Large numbers of migrant ducks, primarily mallards, stop along the Yellowstone during spring and fall. Estimates of 30,000 to 50,000 ducks using the river below Billings have been made in 1974 and 1975. Species known to nest along the river include mallards, blue and green-winged teal, wood ducks, and mergansers. The potential effects of reduced river flows on these breeding birds are unknown.

Fall waterfowl use of the river is quite variable and apparently dependent upon weather. In the portion of the river below Billings, peak counts have ranged up to 60,000 ducks, primarily mallards. One possible effect of low water flows would be a hastening in the date of freeze up, which in turn would shorten the duration of fall mallard use along the river.

Species known to winter on open portions of the river include common goldeneye, Barrow's goldeneye, and common merganser. Reduced flows would probably affect these species, because there would be less available open water. Similarly Canada geese and mallards use open portions of the upper river during winter.

Bald eagles congregate along the Yellowstone during spring and fall, with some eagles remaining over winter. The peak numbers of eagles present during both spring and fall along the river below Billings have ranged from 90 to 120. When compared to other reported eagle concentrations (McClelland 1973; Martinka 1974), these counts rank as fairly impressive for any state except Alaska.

Large concentrations of eagles during spring and fall may be in response to waterfowl concentrations during those time periods. Ducks are probably a supplement to the main diet of eagles, which appears to be fish and carrion. Thus, any decrease in waterfowl concentrations or fish populations due to reduced water levels in the river might be detrimental to bald eagles.

Great blue herons usually arrive on the Yellowstone in March, depending on weather and ice conditions. They nest in colonies (rookeries) high in cottonwood trees along the river. There are 19 known rookeries along the Yellowstone. Peak counts of up to 350 herons have been made on the river below Billings. The potential effects of reduced river flows on this species are unknown, but any decrease in fish populations or mature cottonwood groves might affect them.

White pelicans are present along the lower river from spring through fall. During spring, 300-450 pelicans have been observed below Miles City. Summer populations usually number between 100 and 200, mainly in the Powder River and Intake areas. These birds are probably a nonbreeding segment of the populations that breed in northern Montana. Any reduction in fish populations might be detrimental to these birds.

A more detailed discussion of migratory bird use along the lower Yellowstone will appear in the migratory bird section of the Old West Regional Commission Yellowstone River Study to be completed by the Montana Department of Natural Resources and Conservation in early 1977.

Environmental detriments of maintaining a minimum flow must relate to a comparison between not maintaining the flow and maintaining the full amount requested. We believe there would be some environmental detriments with our reservation in those portions of the Yellowstone basin where we have requested specific "numbers" for streamflows needed. These detriments hinge on the assumption that all water over and above our requests would be allocated and eventually withdrawn from the streams for other uses.

Where we have requested specific flow "numbers" in our water reservation, we have ourselves ultimately altered the natural flow regime of many streams in the basin if other water users are annually allowed to remove the water in excess of this request. By setting "numbers" in streams which currently do not appreciably suffer from low water, we have given up for possible future diversionary use a portion of the historical streamflow the aquatic organisms have been associated with. This will likely result in future populations becoming established at lower levels if future diversionary uses of the remaining water evolve. What this will accomplish is an increase in the frequency of low flow periods over those which have historically occurred and through which aquatic and riparian populations have adapted. More frequent low flow periods will reduce habitat size, change water quality, alter riparian vegetation and habitat used by terrestrial animals and ultimately alter the entire ecosystem associated with the stream course. Due to the importance of these resources to the people of Montana, it becomes obvious that significant reduction in their availability for enjoyment will be a future environmental detriment to the resource as well as to those people who utilize this resource for recreation. Conversely,

to maintain at least some semblance of the natural flow regime through approval of this reservation request will be an environmental benefit to current and future human generations and to the affected organisms themselves.

However, this will not be true for the Yellowstone River basin upstream from Big Timber. Our requests for this portion of the basin will produce only small environmental detriments since no change in natural streamflow conditions will be evident except during the spring runoff period. Thus those aquatic and riparian populations which now depend on the Yellowstone and its tributaries will likely remain the same if streamflow is the only variable considered. Other changes in habitat due to land use changes and channel modification might alter these populations in the future regardless of streamflow conditions.

During Spring high flow periods we have requested streamflow "numbers" in this portion of the basin, because it is not practical to request instantaneous high flows which include floods. Assuming these flows would be approved and all flows above those would be withdrawn in the future, there could be some environmental detriments to the river system. These detriments are difficult to predict, but will be related to changes in stream channel morphology and sediment transport. Changes in these parameters could produce changes in habitat for aquatic and riparian wildlife species.

Environmental benefits associated with our request in the upper Yellowstone basin are a continuation of the existing trout fisheries in these streams and a continuation of the physical, chemical and biological relationships the tributaries have enjoyed with the mainstem Yellowstone River. These relationships contribute to the high quality trout fishery which exists in this "blue ribbon" stretch of the river and which is now enjoyed by many people of Montana and the nation. To not maintain the requested flows will contribute to the degradation of these important resources.

STATEMENT OF THE AMOUNT OF WATER NECESSARY FOR THE PURPOSE OF THE RESERVATION

In specifying the quantities of water being requested for flow reservation, it must be acknowledged that during the present, and perhaps now normal, fluctuations in discharge in the Yellowstone River basin, there will be times when the streams will not be capable of supplying the quantities of water requested. It is our intent in requesting these quantities that under all natural hydrologic conditions, future water use permits be conditioned to cease when river discharges reach the levels requested in this application. When river levels drop below the quantities requested due to existing uses or natural phenomena, we fully anticipate that our requests will not be met. Under no circumstances should these figures be construed to imply that augmenting the natural flow through impoundment of flood waters for later discharge will in any way improve upon the existing natural conditions as we now find them in and along the Yellowstone River.

Certain considerations must be recognized if the flow reservation figures for the Yellowstone are to be meaningful. The recommended flows must approximate the seasonal variations which occur naturally if existing aquatic conditions are to be maintained. It is also important that the requested flows will occur with a reasonable degree of frequency.

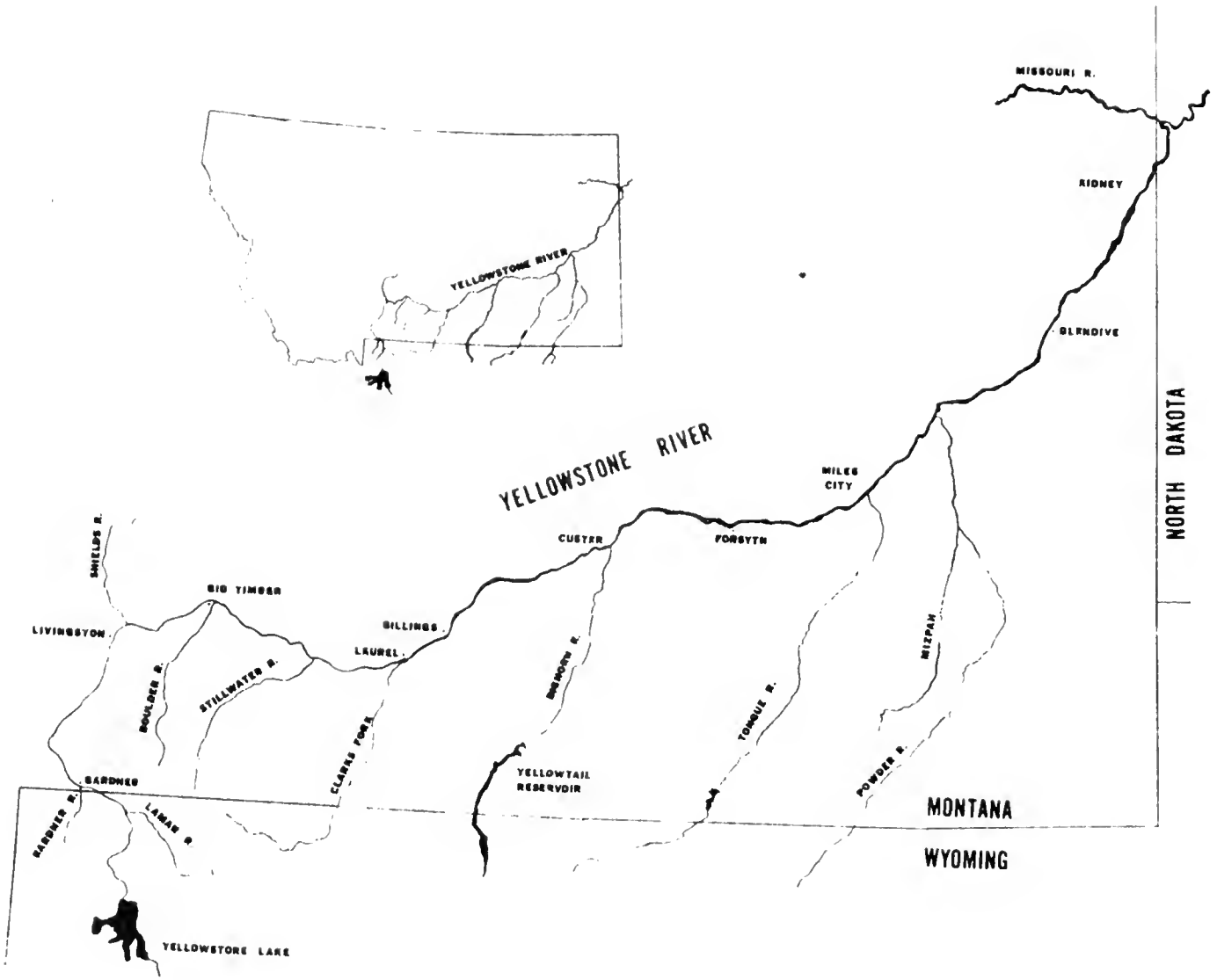
The flow quantities in our reservation requests take two forms in this application. The first form encompasses the Yellowstone River and its tributaries from Gardiner to the Boulder River at Big Timber. This stretch of the Yellowstone has been previously described as an important and unique blue ribbon stream of state and national importance. We have also tried to show that it is not possible to separate the tributary streams to this reach from the mainstem itself, due to the physical and biological relationships which are inherent between the two, i.e., the fishery in the mainstem is dependent upon tributary streams for water quantity and quality, as well as for sources of new fish to supply the system.

Thus, in view of the importance of this famous river, it is felt that establishment of a single set of "numbers" as recommendations for instream flow needs would be a first step in degrading the high quality of the "blue ribbon" portion of the river and its fishery. Simply assigning flow "numbers" to this part of the river would eventually place limitations on the fishery which do not exist today. Because the Yellowstone is unregulated by man, aquatic resources have evolved to existing relative numbers and status due to a multitude of historical streamflow conditions; i.e., the extreme highs and lows as well as all other flows inbetween. Thus to eventually limit flows to a monthly "number" could effectively alter the status of those existing aquatic resources. It was therefore felt that the low flow period between August and April were most critical to maintain, and that flows should not be established at a "number" during that period or portions thereof.

Only during the spring runoff periods did it seem infeasible to request the instantaneous flow, since this would include floods (some of which could be of great magnitude), and other high water conditions. High flows are responsible for maintaining channel form processes by transporting sediment and allowing bedload movement to occur. These processes build the physical habitat which aquatic and riparian species require (in addition to suitable streamflows) in a stream and are, therefore, necessary functions of the ecosystem. It was, therefore, believed some portion of the high spring flows should be reserved.

Therefore, in the upper Yellowstone basin we have elected to provide flow "numbers" where possible during the high flow period. During the remaining months we have requested "the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach." During May or June we have requested a peak flow preceded by a rise in April and/or May and followed by a recession in July and August. The peak flow requested is the "dominant discharge" for the stream. The dominant discharge is the discharge which occurs with a frequency of about 1.5 years and is sometimes called the "bankful" discharge (Leopold and Wolman 1964). The dominant discharge is the discharge which is primarily responsible for maintaining the shape and other features of the stream channel, which in turn is what determines the amount and type of physical habitat for fish and other aquatic organisms. This discharge is equaled or exceeded about 67% of the time. Flow is less than the dominant discharge 33% of the time, so there will be times when the discharge will be less than requested. The implications of this lesser natural discharge from our viewpoint were addressed in the first paragraph of this section.

The second form of our request encompasses the remainder of the Yellowstone basin downstream from the Boulder River at Big Timber. Flow "numbers" were recommended in all cases for the mainstem and its tributaries. These numbers were derived by various methods.



Yellowstone River drainage.

ATTACHMENTS TO THE STATEMENT OF THE AMOUNT OF WATER NECESSARY FOR THE PURPOSE OF THE RESERVATION

Flow (or level) recommendations are given for individual streams and/or stream reaches. A standard outline has been followed for continuity between streams. Only principal and important fish and wildlife species which depend upon streamflow are listed; a complete list would be quite extensive, and impractical for each stream or stream reach.

Life history periodicity charts show the periods of the year when important fish species migrate, spawn and perform other necessary life cycle activities. Important waterfowl species are shown on the same charts when applicable. The charts are intended to show why flows (or levels) are necessary throughout the year in a given stream reach. Where more intensive life history data were available, the charts reflect that data. For example, brook trout will show different spawning times in the same drainage when those data were available. In some drainages more specific data were not available and a single chart represents all streams. For example, only one chart is shown for all species in the upper Yellowstone basin since charts for individual streams would be the same anyway, given the limited data available on each stream.

Methods used to request streamflows are simply listed in Item 7 of each attachment when a standard method or concept was used (for example, the Water Surface Profile Program). A more complete description is given for these standard methods and concepts in Appendix A. Where other methods were used the methods are described in greater detail in Item 7.

Streams are alphabetical in order within each portion of the basin as follows:

(1) Upper basin - Gardiner to Boulder River at Big Timber

(2) Middle basin - Boulder River to Bighorn River

(3) Lower basin - Bighorn River to North Dalota state line

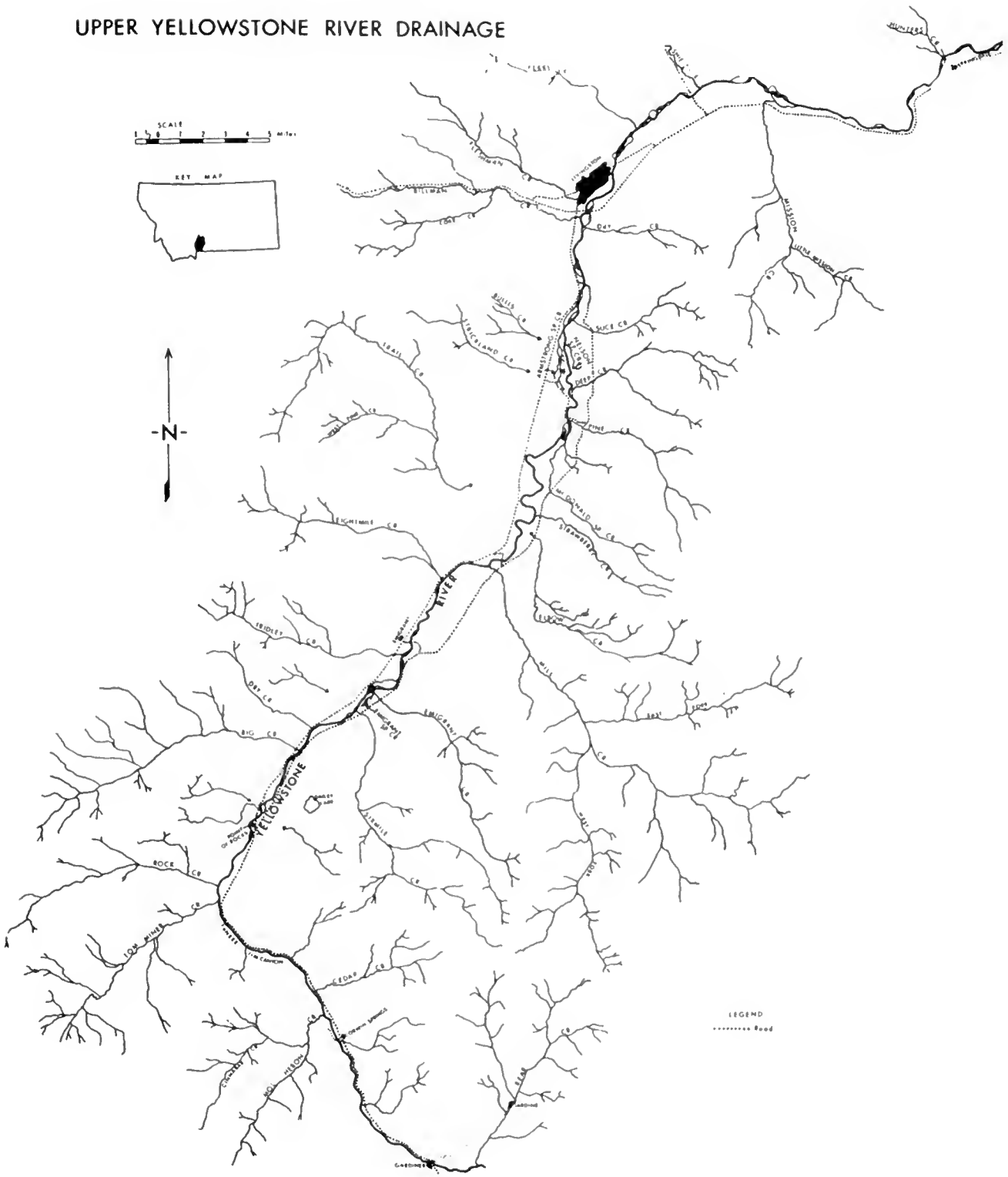
The page upon which a particular stream is located can be found in the Table of Contents at the beginning of this application.

In some cases abbreviations for the names of fish species present are given for the stream reach. The common names that go with these abbreviations are given in Appendix B.

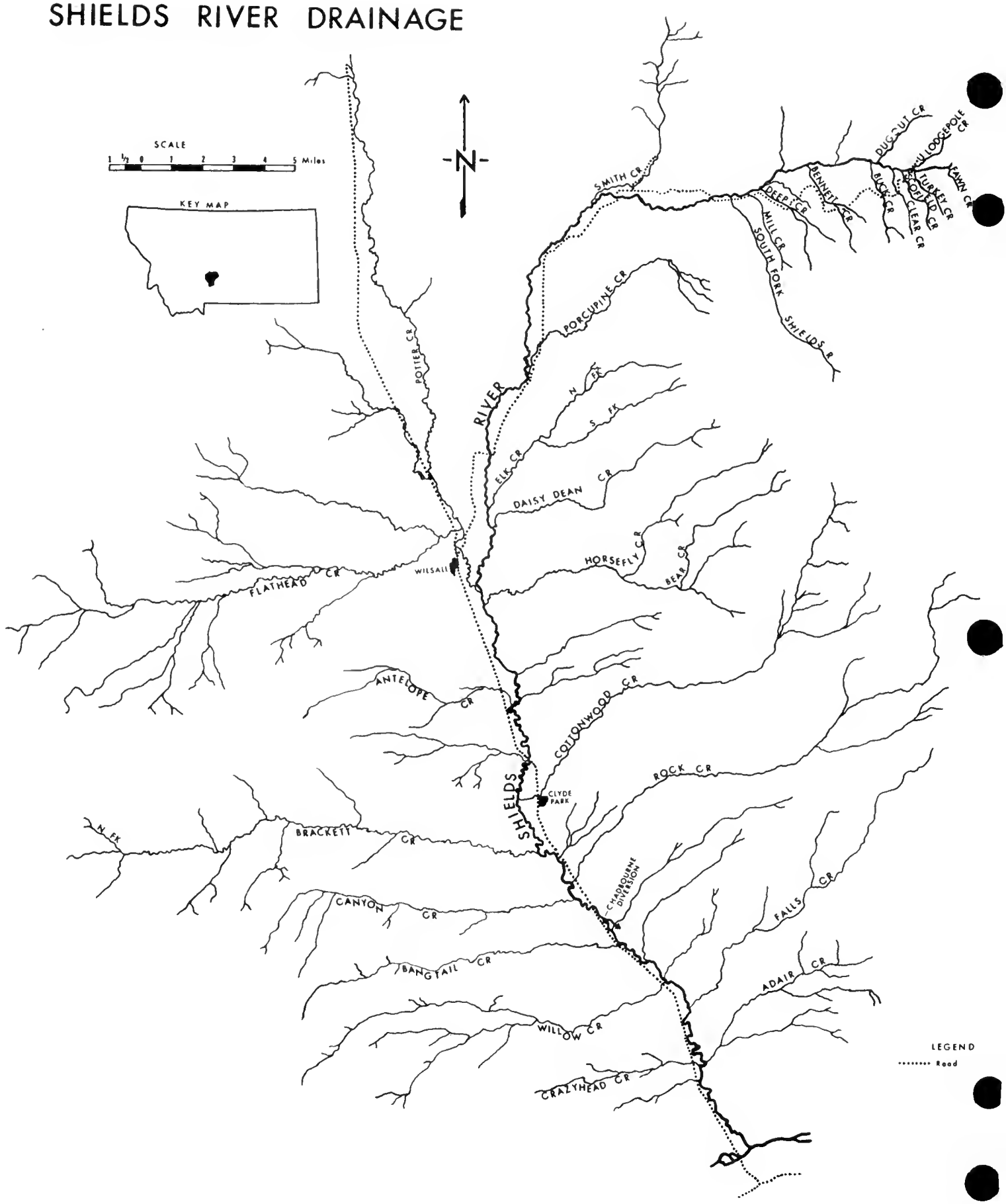
UPPER YELLOWSTONE BASIN

Gardiner to mouth of Boulder River

UPPER YELLOWSTONE RIVER DRAINAGE



SHIELDS RIVER DRAINAGE



1. Name: Armstrong Spring Creek

2. Stream reach: Mouth to origin

3. Location: T3S, R9E, Sec. 23 to T3S, R9E, Sec. 26

4. Fish species present:

   Resident: Rb, LL (Workman 1972, 1973); Ct, Wf[1/]

   Migratory transient: Rb, LL (Berg 1975); Ct, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory: Ducks, geese, swans, great blue heron, shorebirds, bald eagle (Hook 1975)

6. Life history periodicity chart: (See attached). This chart also includes other species in the upper Yellowstone and tributaries, not just those found in Armstrong Spring Creek.

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept; precipitation-runoff method.

8. Why flow is necessary:

   Requested flows are necessary to maintain this highly productive spring creek and the excellent trout population it supports. The request is also needed to maintain documented spawning runs of rainbow and brown trout from the Yellowstone River and potential spawning runs of cutthroat and whitefish. Armstrong Spring Creek is nationally known for its challenge to fly fishermen. Flows requested are also needed to maintain natural channel form and processes.

9. Flow request:

   The instantaneous streamflow subject to existing, lawfully appropriated water rights in the stream reach.

1/ Potential fish species present: although extensive sampling has been done in the Yellowstone and Shields River drainages, more intensive sampling is needed to determine life cycle requirements of fish species present in individual tributary systems. This category represents species that potentially inhabit the stream based on documentation of their presence in similar streams of the drainage and the life history requirements of the species.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Upper Yellowstone River and Tributaries

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Ct												
Passage					----	----	----	----				
Spawning					---	----	----	---				
Incubation					---	----	----	----	----			
Rearing	----	----	----	----	----	----	----	----	----	----	----	----
Rb												
Passage		----	----	----	----							
Spawning			----	----	----							
Incubation			---	----	----	----	----					
Rearing	----	----	----	----	----	----	----	----	----	----	----	----
LL												
Passage									----	----	----	---
Spawning									----	----	----	---
Incubation	----	----	----						----	----	----	----
Rearing	----	----	----	----	----	----	----	----	----	----	----	----
Eb												
Passage												
Spawning									----	----	----	
Incubation	----	----	----						----	----	----	----
Rearing	----	----	----	----	----	----	----	----	----	----	----	----
Wf												
Passage									----	----	----	---
Spawning									----	----	----	--
Incubation	----	----	----						----	----	----	----
Rearing	----	----	----	----	----	----	----	----	----	----	----	----
Canada goose												
Nest Establishment		----										
Incubation			----	----	---							

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section: Upper Yellowstone River and Tributaries

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
RbxCt												
Passage		- - -	- - -	- - -	- - -							
Spawning			- - -	- - -	- - -							
Incubation			- - -	- - -	- - -	- - -	- - -					
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Nest Establishment												
Incubation												

1. Name: Bear Creek

2. Stream reach: Mouth to mouth of North Fork of Bear Creek

3. Location: T9S, R9E, Sec. 19 to T9S, R9E, Sec. 4

4. Fish species present:

   Resident: Rb, Rb x Ct (Berg 1975); Ct[1/]

   Migratory transient: Ct, Rb, Rb x Ct[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout population. These flows are also needed to maintain potential spawning runs of cutthroat, rainbow, brown trout and whitefish from the Yellowstone River. Bear Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Bear Creek

2. Stream reach: North Fork Bear Creek to Fish Lake

3. Location: T9S, R9E, Sec. 4 to T8S, R9E, Sec. 9

4. Fish species present:

   Resident: Ct, Rb, Rb x Ct[1/]

   Migratory transient: Ct, Rb[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain resident trout populations in Bear Creek and to protect potential spawning runs of trout at Knox and Fish Lakes and the lower reaches of Bear Creek. Further, flows are requested to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Big Creek

2. Stream reach: Mouth to Millfork Creek

3. Location: T6S, R7E, Sec. 23 to T6S, R7E, Sec. 17

4. Fish species present:

   Resident: Ct, Rb, Rb x Ct, LL, Wf (Workman, Pers. Comm.)

   Migratory transient: Ct, Wf (Berg 1975); Rb, LL, Rb x Ct[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept, dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout population (Workman 1976). This stream also supports cutthroat trout and mountain whitefish spawning runs from the Yellowstone River. Further, it has potential as a rainbow and brown trout spawning and rearing tributary. Big Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Creek.

1. Name: Big Creek

2. Stream reach: Millfork Creek to Bark Cabin Creek

3. Location: T6S, R7E, Sec. 17 to T6S, R6E, Sec. 32

4. Fish species present:

   Resident: Ct, Rb, Rb x Ct, LL, Wf[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, these flows are necessary to allow potential passage, spawning, and recruitment of trout which may migrate from the lower reaches of Big Creek. Big Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Billman Creek

2. Stream reach: Mouth to mouth Coke Creek

3. Location: T2S, R9E, Sec. 25 to T2S, R9E, Sec. 17

4. Fish species present:

   Resident: Ct, Rb, LL (Berg 1975); Rb x Ct, Eb, Wf[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept, dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout population (Berg 1975) and to maintain potential spawning migrations of cutthroat, rainbow and brown trout, and whitefish from the Yellowstone River. Billman Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Billman Creek

2. Stream reach: Coke Creek to Fork south of NE Corner Sec. 20

3. Location: T2S, R9E, Sec. 17 to T2S, R8E, Sec. 20 NE Corner

4. Fish species present:

   Resident: Ct, Rb, Rb x Ct, EB (Berg 1975); LL, Wf[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Eb, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout population and potential spawning migrations of trout and whitefish from the lower reaches of Billman Creek and from the Yellowstone River. Billman Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain natural channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Brackett Creek

2. Stream reach: Mouth to Sheep Creek

3. Location: T1N, R9E, Sec. 3 to T1N, R8E, Sec. 2

4. Fish species present:

   Resident: Ct, Rb, LL, Wf (Berg 1975); Rb x Ct[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Eb, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow and brown trout, and whitefish from the Shields River. Brackett Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - April 15; July 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

	cfs	ac. ft.		cfs	ac. ft.
April 16 - 30	35	1,041	June 1 - 10	69	1,369
May 1 - 10	66	1,309	June 11 - 20	56	1,111
May 11 - 20	72	1,428	June 21 - 30	43	853
May 21 - 31	77	1,680	July 1 - 10	33	655

   Flow to equal or exceed 151 cfs for at least one continuous 24-hour period between April 16 - July 31.

   Total Ac. Ft. = 9,676 (includes 151 cfs for 1 day)

1/See Armstrong Spring Creek.

1. Name: Brackett Creek

2. Stream reach: Sheep Creek to Skunk Creek

3. Location: T1N, R8E, Sec 2 to T1N, R7E, Sec. 2

4. Fish species present:

   Resident: Ct, LL, Wf (Berg 1975); Rb[1/]

   Migratory transient: Ct, Rb, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow and brown trout, and whitefish from the lower reaches of Brackett Creek and from the Shields River. Brackett Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Brackett Creek

2. Stream reach: Skunk Creek to one mile up North, Middle and South Forks

3. Location: T1N, R7E, Sec 2 to T1N, R7E, Sec's. 6, 7, 18

4. Fish species present:

   Resident: Ct, Eb, LL, Wf (Berg 1975)

   Migratory transient: Ct, Rb, LL Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow and brown trout, and whitefish from the lower reaches of Brackett Creek. Brackett Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Cedar Creek

2. Stream reach: Mouth to Second Fork Cedar Creek

3. Location: T8S, R7E, Sec. 13 to T8S, R8E, Sec. 8

4. Fish species present:

   Resident: Ct, Rb, LL, Eb, Wf (Berg 1975); Rb x Ct[1/]

   Migratory transient: Ct (Berg 1975); Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, these flows are necessary to allow passage, spawning, and recruitment of cutthroat trout which migrate from the Yellowstone River to spawn. Further, it has potential as a whitefish, rainbow and brown trout spawning and rearing tributary. Cedar Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow Request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Cedar Creek

2. Stream reach: Second fork to North Fork of Cedar Creek

3. Location: T8S, R8E, Sec. 8 to T8S, R8E, Sec. 9

4. Fish species present:

   Resident: Ct, Rb, Rb x Ct, LL, Eb, Wf[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept, dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and potential spawning migration from the lower reaches of Cedar Creek and from the Yellowstone River. Cedar Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Cinnabar Creek

2. Stream reach: Mouth to Cottonwood Creek

3. Location: T8S, R7E, Sec. 25 to T8S, R7E, Sec. 27

4. Fish species present:

   Resident: Rb, Rb x Ct (Berg 1975); Ct, LL, Eb, Wf[1/]

   Migratory transient: Ct, Wf, Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to sustain a resident trout population. Also, these flows are necessary to allow potential passage, spawning and successful recruitment of Yellowstone cutthroat, rainbow and brown trout, and whitefish which may migrate from the Yellowstone River[1/]. Cinnabar Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Cinnabar Creek

2. Stream reach: Cottonwood Creek to FS boundary at T8S, R7E, Sec. 32

3. Location: T8S, R7E, Sec. 27 to T8S, R7E, Sec. 32

4. Fish species present:

   Resident: Rb, Eb (Berg 1975); Ct, Rb x Ct, LL, Wf[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and potential spawning migrations from the lower reach of Cinnabar Creek, Mol Heron Creek and the Yellowstone River. Cinnabar Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Creek.

1. Name: Coke Creek

2. Stream reach: Mouth to Minor Creek

3. Location: T2S, R9E, Sec. 17 to T2S, R8E, Sec. 26

4. Fish species present:

   Resident: Ct (Berg 1975); Rb, Rb x Ct, LL, Eb[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Eb[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to sustain a resident trout fishery. Also, these flows are necessary to allow potential passage, spawning and successful recruitment of cutthroat, rainbow, brown trout, and whitefish from Billman Creek and the Yellowstone River. Further, the requested flows are necessary to maintain flows in Billman Creek. Coke Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Cottonwood Creek

2. Stream reach: Mouth to Little Cottonwood

3. Location: T2N, R9E, Sec. 33 to T3N, R10E, Sec. 35

4. Fish species present:

   Resident: Ct, Rb, Rb x Ct, LL, Eb (Berg 1975)

   Migratory transient: Ct, Rb, Rb x Ct, LL, Eb[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow and brown trout, and whitefish from the Shields River. Cottonwood Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Cottonwood Creek

2. Stream reach: Little Cottonwood Creek to Trespass Creek

3. Location: T3N, R10E, Sec. 35 to T3N, R11E, Sec. 7

4. Fish species present:

   Resident: Ct, Rb, RbxCt, LL, Eb (Berg 1975); Wf[1/]

   Migratory transient: Ct, Rb, RbxCt, LL, Eb[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow, brown and brook trout and whitefish from the lower reach of Cottonwood Creek. Cottonwood Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Eight Mile Creek

2. Stream reach: Mouth to Big Draw

3. Location: T5S, R8E, Sec. 14 to T4S, R8E, Sec. 31

4. Fish species present:

   Resident: Ct, Rb, Eb (Berg 1975); Rb x Ct, LL, Wf[1/]

   Migratory transient: Wf (Berg 1975); Ct, Rb, Rb x Ct, LL[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout fishery (Berg 1975). Also, these flows are necessary to allow passage, spawning and successful recruitment of whitefish which migrate from the Yellowstone River and for potential spawning runs of cutthroat, rainbow and brown trout from the Yellowstone River. Eight Mile Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Eight Mile Creek

2. Stream reach: Big Draw to North Fork of Eightmile Creek

3. Location: T4S, R8E, Sec. 31 to T4S, R7E, Sec. 34

4. Fish species present:

   Resident: Ct, Rb, Eb (Berg 1975); Rb x Ct, LL, Wf[1/]

   Migratory transient: Wf (Berg 1975); Ct, Rb, Rb x Ct, LL[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to allow potential passage, spawning, and recruitment of trout from the lower reaches of Eight Mile Creek and from the Yellowstone River. Eight Mile Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). Requested flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Emigrant Spring Creek

2. Stream reach: Mouth to origin

3. Location: T6S, R8E, Sec. 8 to T6S, R8E, Sec. 8

4. Fish species present:

   Resident: LL, Eb, Wf (Berg 1975); Ct, Rb, Rb x Ct[1/]

   Migratory transient: Ct, Rb, LL (Berg 1975); Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept; precipitation-run-off method.

8. Why flow is necessary:

   Requested flows are necessary to maintain this highly productive spring creek and the excellent trout population it supports. The flows are also needed to maintain documented spawning runs of cut-throat, rainbow and brown trout from the Yellowstone River and for potential spawning runs of whitefish. The creek is well known for its challenge to fly fishermen (Berg 1975). Flows requested are needed to maintain channel form and processes.

9. Flow request:

   The instantaneous streamflow, subject to existing, lawfully appropriated water rights in the stream reach.

1/See Armstrong Spring Creek.

1. Name: Flathead Creek

2. Stream reach: Mouth to Muddy Creek

3. Location: T3N, R9E, Sec. 29 to T3N, R8E, Sec. 13

4. Fish species present:

   Resident: Ct, LL, Wf (Berg 1975)

   Migratory transient: Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow and brown trout and whitefish from the Shields River. Cottonwood Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Flathead Creek

2. Stream reach: Muddy Creek to Cache Creek

3. Location: T3N, R8E, Sec. 13 to T3N, R7E, Sec. 26

4. Fish species present:

   Resident: Ct, LL, Eb, Wf (Berg 1975)

   Migratory transient: Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow and brown trout and whitefish from the lower reaches of Flathead Creek and from the Shields River (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Flathead Creek

2. Stream reach: Cache Creek to South Fork Flathead Creek

3. Location: T3N, R7E, Sec. 26 to T3N, R6E, Sec. 36

4. Fish species present:

   Resident: Ct, Eb (Berg 1975)

   Migratory transient: Ct, Eb, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, brown and brook trout and whitefish from the lower reaches of Flathead Creek. Flathead Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Fleshman Creek

2. Stream reach: Mouth to Perkins Creek

3. Location: T2S, R10E, Sec. 18 to T2S, R9E, Sec. 6

4. Fish species present:

   Resident: Ct, Rb, LL, Eb (Berg 1975); Rb x Ct[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout population. Also, these flows are necessary to allow potential passage, spawning, and successful recruitment of cutthroat, rainbow, and brown trout, and whitefish which may migrate from the Yellowstone River. Fleshman Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek.

1. Name: Fridley Creek

2. Stream reach: Mouth to Miller Creek

3. Location: T5S, R8E, Sec. 33 to T5S, R7E, Sec. 36

4. Fish species present:

   Resident: Ct, Rb, Eb (Berg 1975); Rb x Ct[1/]

   Migratory transient: Wf (Berg 1975); Ct, Rb, Rb x Ct, LL[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to sustain a resident trout fishery (Berg 1975). Also, these flows are necessary to allow passage, spawning, and successful recruitment of whitefish which migrate from the Yellowstone River, and potential cutthroat, rainbow and brown trout spawning runs from the Yellowstone River. Fridley Creek lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). Requested flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Fridley Creek

2. Stream reach: Miller Creek to Needle Creek

3. Location: T5S, R7E, Sec. 36 to T5S, R7E, Sec. 20

4. Fish species present:

   Resident: Ct, Rb, Eb (Berg 1975); RbxCt[1/]

   Migratory transient: Ct, Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. They are also needed for potential passage, spawning and recruitment of trout and whitefish which may migrate from the lower reaches of Fridley Creek and from the Yellowstone River. Fridley Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Little Mission Creek

2. Stream reach: Mouth to Little Mission Forks

3. Location: T2S, R11E, Sec. 33 to T3S, R11E, Sec. 2

4. Fish species present:

   Resident: Ct (Berg 1975)

   Migratory transient: Ct, Rb[1/]

5. Wildlife Species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, these flows are necessary to allow potential passage, spawning, and recruitment of trout which may migrate from the lower reaches of Mission Creek. Mission Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: McDonald Spring Creek

2. Stream reach: Mouth to northern boundary of Section 22

3. Location: T4S, R9E, Sec. 11 to T4S, R9E, Sec. 22 northern boundary

4. Fish species present:

   Resident: Rb, LL, Wf (Berg 1975); Ct, Rb x Ct[1/]

   Migratory transient: Rb, LL, Ct (Berg 1975); Rb x Ct, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek).

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept; precipitation-runoff method.

8. Why flow is necessary:

   Requested flows are necessary to maintain this highly productive spring creek and the excellent resident trout population it supports. These flows are also requested to maintain documented spawning runs of Yellowstone cutthroat, rainbow and brown trout from the Yellowstone River and potential spawning runs of whitefish. McDonald Spring Creek is well known for its challenge to fly fishermen (Berg 1975). Requested flows are needed to maintain channel form and processes.

9. Flow request:

   The instantaneous streamflow, subject to existing, lawfully appropriated water rights in the stream reach.

1/See Armstrong Spring Creek.

1. Name: Mill Creek

2. Stream reach: Mouth to East Fork Mill Creek

3. Location: T5S, R9E, Sec. 7 to T6S, R9E, Sec. 13

4. Fish species present:

   Resident: Ct, RbxCt (Berg 1975);
   Rb, LL, Wf[1/]

   Migratory transient: Ct (Berg 1975);
   Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, they are needed to allow passage, spawning and recruitment of cutthroat trout which migrate from the Yellowstone River. Further, Mill Creek has potential as a whitefish, rainbow and brown trout spawning and rearing tributary. Mill Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Mill Creek

2. Stream reach: East Fork Mill Creek to Passage Creek

3. Location: T6S, R9E, Sec. 13 to T6S, R10E, Sec. 29

4. Fish species present:

   Resident - Ct, Wf (Berg 1975)

   Migratory transient - Rb[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, they are needed to allow potential passage, spawning and recruitment of trout which may migrate from the lower reach of Mill Creek and from the Yellowstone River. Mill Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Mill Creek

2. Stream reach: Passage Creek to Lambert Creek

3. Location: T6S, R10E, Sec. 29 to T6S, R10E, Sec. 36

4. Fish species present:

   Resident: Ct (Berg 1975);
   Rb, Wf[1/]

   Migratory transient: Ct, Rb, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Fish populations were surveyed (Berg 1975). Dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, they are needed to allow potential passage, spawning and recruitment of trout which may migrate from the lower reaches of Mill Creek. Mill Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Mission Creek

2. Stream reach: Mouth to Spring Creek

3. Location: T1S, R11E, Sec. 29 to T2S, R11E, Sec. 17

4. Fish species present:

   Resident: Rb, LL, Wf (Berg 1975);
   Ct, RbxCt[1/]

   Migratory transient: Wf (Berg 1975);
   Ct, Rb, RbxCt, LL[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout population. Also, these flows are necessary to allow passage, spawning and recruitment of whitefish which migrate from the Yellowstone River, and potential cutthroat, rainbow and brown trout spawning runs from the Yellowstone River. Mission Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Mission Creek

2. Stream reach: Spring Creek to Little Bear Draw

3. Location: T2S, R11E, Sec. 17 to T2S, R11E, Sec. 33

4. Fish species present:

   Resident: Ct, Rb, RbxCt, LL (Berg 1975); Wf[1/]

   Migratory transient: Ct, Rb, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout population. Also, these flows are necessary to allow potential passage, spawning and recruitment of fish which may migrate from the lower reach of Mission Creek and the Yellowstone River. Mission Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Mol Heron Creek

2. Stream reach: Mouth to Cinnabar Creek

3. Location: T8S, R7E, Sec. 24 to T8S, R7E, Sec. 25

4. Fish species present:

   Resident: Ct, Rb, LL, Wf, RbxCt (Berg 1975)

   Migratory transient - Ct, Wf (Berg 1975);
   Rb, LL, RbxCt[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to sustain a resident fish population (Berg 1975). Also, these flows are necessary to allow passage, spawning and successful recruitment of cutthroat trout and whitefish which migrate from the Yellowstone River and potential spawning runs of rainbow and brown trout from the Yellowstone River. Mol Heron Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Mol Heron Creek

2. Stream reach: Cinnabar Creek to Yellowstone Park Boundary

3. Location: T8S, R7E, Sec. 25 to T9S, R7E, Sec. 20

4. Fish species present:

   Resident: Ct, Rb (Berg 1975);
   RbxCt, LL, Wf[1/]

   Migratory transient: Ct, Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, these flows are necessary to allow potential passage, spawning and recruitment of trout which may migrate from the lower reaches of Mol Heron Creek. Mol Heron Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Nelson Spring Creek

2. Stream Reach - Mouth to origin

3. Location: T3S, R9E, Sec. 23 to T3S, R9E, Sec. 26

4. Fish species present:

   Resident: Rb, LL (Berg 1975); Ct, Wf[1/]

   Migratory transient: Ct, Rb, LL (Berg 1975); Rb x Ct, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept, dominant discharge concept; precipitation-runoff method.

8. Why flow is necessary:

   Requested flows are necessary to maintain this highly productive spring creek and the excellent resident trout population it supports. The flows are also needed to maintain documented spawning runs of cutthroat, rainbow and brown trout from the Yellowstone River and for potential spawning runs of whitefish. Nelson Spring Creek is nationally known for its challenge to fly fishermen (Berg 1975). Flows requested are also needed to maintain natural channel form and processes.

9. Flow request:

   The instantaneous streamflow, subject to existing, lawfully appropriated water rights in the stream reach.

1/See Armstrong Creek.

1. Name: Rock Creek (Shields Drainage)

2. Stream reach: Mouth to Forest Service west boundary Sec. 8

3. Location: T1N, R9E, Sec. 11 to T2N, R11E, Sec. 8

4. Fish species present:

   Resident: Ct, LL, Eb (Berg 1975);
   Rb, RbxCt, Wf[1/]

   Migratory transient: Ct, Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, brown and rainbow trout and whitefish from the Shields River. Rock Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Rock Creek (Shields Drainage)

2. Stream reach: Forest Service west boundary Sec. 8 to Smeller Creek

3. Location: T2N, R11E, Sec. 8 to T3N, R11E, Sec. 22

4. Fish species present:

   Resident: Ct, LL, Eb, Rb, Wf[1/]

   Migratory: Ct, LL, Eb, Rb, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, brown and brook trout from the Shields River. Rock Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Rock Creek (of the Yellowstone)

2. Stream reach: Mouth to Steele Creek

3. Location: T7S, R7E, Sec. 19 to T7S, R6E, Sec. 20

4. Fish species present:

   Resident: Ct (Workman 1976);
   Rb, RbxCt, Wf[1/]

   Migratory transient: Ct (Berg 1975);
   Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to sustain a resident trout population. Also, these flows are necessary to allow passage, spawning, and successful recruitment of cutthroat trout which migrate from the Yellowstone River, and potential spawning runs of rainbow and brown trout and whitefish from the Yellowstone River. Rock Creek lies in a heavy recreational use area and is utilized by fishermen. Requested flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Shields River

2. Stream reach: Mouth to Cottonwood Creek

3. Location: T1S, R10E, Sec. 26 to T2N, R9E, Sec. 33

4. Fish species present:

   Resident: Ct, Rb, Rb x Ct, LL, Wf (Berg 1975)

   Migratory transient: Ct, Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle, great blue heron (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident trout population and to maintain potential spawning runs of cutthroat, rainbow and brown trout, and whitefish from the Yellowstone River. The Shields River lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain natural channel form and processes.

9. Flow request:

   January 1 - March 31; July 11 - December 31 - the instantaneous streamfow subject to existing lawfully appropriated water rights in the stream reach.

	cfs	ac. ft.		cfs	ac. ft.
April 1 - 15	99	2,945	June 1 - 10	325	6,446
April 16 - 30	156	4,641	June 11 - 20	278	5,514
May 1 - 10	240	3,094	June 21 - 30	151	2,995
May 11 - 20	319	6,327	July 1 - 10	80	1,587
May 21 - 31	287	6,262			

   Flow to equal or exceed 774 cfs for at least one continuous 24-hour period between April 1 - July 10.

   Total Ac. Ft. = 41,346 (includes 774 cfs for 1 day)

1/See Armstrong Spring Creek.

1. Name: Shields River

2. Stream reach: Cottonwood Creek to Elk Creek

3. Location: T2N, R9E, Sec. 33 to T3N, R9E, Sec. 8

4. Fish species present:

   Resident: Ct, Rb, LL, Wf (Berg 1975); Rb x Ct[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle, great blue heron (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow and brown trout and whitefish from the lower reach of the Shields River and from the Yellowstone River. The Shields River lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - April 15; July 21 - December 31 - the instantaneous streamflow subject to existing, lawfully appropriated water rights in the stream reach.

	cfs	ac. ft.		cfs	ac. ft.
April 16 - 30	39	1,160	June 11 - 20	157	3,114
May 1 - 10	83	1,646	June 21 - 30	105	2,083
May 11 - 20	137	2,717	July 1 - 10	56	1,111
May 21 - 31	184	4,014	July 11 - 20	36	714
June 1 - 10	189	3,749			

   Discharge to equal or exceed 457 cfs for at least one continuous 24-hour period between April 15 and July 31.

   Total Ac. Ft. = 21,214 (includes 457 cfs for 1 day)

1/See Armstrong Spring Creek.

1. Name: Shields River

2. Stream reach: Elk Creek to Lodgepole Creek

3. Location: T3N, R9E, Sec. 8 to T5N, R11E, Sec. 16

4. Fish species present:

   Resident: Ct, Rb, LL, Eb, Wf (Berg 1975); Rb x Ct[1/]

   Migratory transient: Ct, Rb, Rb x Ct, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle, great blue heron (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, rainbow and brown trout, and whitefish from the lower reaches of the Shields River and the Yellowstone River. The Shields River lies in an area of increasing recreation use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/See Armstrong Spring Creek.

1. Name: Sixmile Creek

2. Stream reach: Mouth to North Fork Sixmile Creek

3. Location: T6S, R8E, Sec. 8 to T7S, R8E, Sec. 9

4. Fish species present:

   Resident: Ct, LL (Berg 1975);
   Rb, RbxCt[1/]

   Migratory transient: Ct, Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. These flows are also necessary to allow potential passage, spawning and successful recruitment of cutthroat, rainbow and brown trout, and whitefish which may migrate from the Yellowstone River. Sixmile Creek lies in a heavy recreational use area and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Smith Creek

2. Stream reach: Mouth to Bitter Creek

3. Location: T5N, R9E, Sec. 26 to T6N, R10E, Sec. 31

4. Fish species present:

   Resident: Ct, LL, Eb (Berg 1975); Wf[1/]

   Migratory transient: Ct, Rb, LL, Eb, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why the flow is necessary:

   Requested flows are necessary to maintain a resident fish population and to maintain potential spawning of cutthroat, brown and brook trout, and whitefish from the Shields River. Smith Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - March 31; July 21 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   April 1 - July 20 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Suce Creek

2. Stream reach: Mouth to Lost Creek

3. Location: T3S, R9E, Sec. 14 to T3S, R10E, Sec. 16

4. Fish species present:

   Resident: Ct, Rb, RbxCt, LL (Berg 1975); Wf[1/]

   Migratory transient: Ct, Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to sustain a resident trout population. Also, these flows are necessary to allow potential passage, spawning and successful recruitment of Yellowstone cutthroat, rainbow and brown trout and whitefish which may migrate from the Yellowstone River. Suce Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Tom Miner Creek

2. Stream reach: Mouth to Canyon Creek

3. Location: T7S, R7E, Sec. 30 to T7S, R6E, Sec. 36

4. Fish species present:

   Resident: Ct, LL (Berg 1975);
   Rb, Wf[1/]

   Migratory transient: Ct, Wf (Berg 1975);
   Rb, LL, RbxCt[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to sustain a resident fish population. Also, these flows are necessary to allow passage, spawning and successful recruitment of cutthroat trout and whitefish which migrate from the Yellowstone River and potential rainbow and brown trout spawning runs. Tom Miner Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Tom Miner Creek

2. Stream reach: Canyon Creek to Trail Creek

3. Location: T7S, R6E, Sec. 36 to T8S, R6E, Sec. 19

4. Fish species present:

   Resident: Ct (Berg 1975);
   Rb, RbxCt, LL, Wf[1/]

   Migratory transient: Ct, Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, these flows are necessary to allow potential passage, spawning and recruitment of trout which may migrate from the lower reaches of Tom Miner Creek. Tom Miner Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Trail Creek

2. Stream reach: Mouth to West Pine Creek

3. Location: T3S, R9E, Sec. 14 to T4S, R8E, Sec. 11

4. Fish species present:

   Resident: RbxCt, LL (Berg 1975);
   Ct, Rb[1/]

   Migratory transient: Ct, Rb, RbxCt, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, these flows are necessary to allow potential passage, spawning, and successful recruitment of cutthroat, rainbow and brown trout, and whitefish which may migrate from the Yellowstone River. Trail Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong Spring Creek

1. Name: Trail Creek

2. Stream reach: West Pine Creek to South Boundary Sec. 35

3. Location: T4S, R8E, Sec. 11 to T3S, R7E, Sec. 35

4. Fish species present:

   Resident: RbxCt, LL (Berg 1975)

   Migratory transient: Ct, Rb, LL, Wf[1/]

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, marten, river otter (Constan 1975)

   Migratory transient: Ducks, bald eagle (Hook 1975)

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue-ribbon concept; dominant discharge concept.

8. Why flow is necessary:

   Requested flows are necessary to maintain a resident fish population. Also, they are needed to allow potential passage, spawning and recruitment of trout which may migrate from the lower reaches of Trail Creek. Trail Creek lies in an area of increasing recreational use and is utilized by fishermen (Berg 1975). These flows are also needed to maintain channel form and processes.

9. Flow request:

   January 1 - May 10; August 11 - December 31 - the instantaneous streamflow subject to existing lawfully appropriated water rights in the stream reach.

   May 11 - August 10 - 24-hour dominant discharge, to be determined.

1/ See Armstrong spring Creek

1. Name: Yellowstone River

2. Stream reach: Gardiner to Tom Miner Creek

3. Location: T9S, R8E, Sec. 23 to T7S, R7E, Sec. 30

4. Fish species present:

   Resident: Ct, Rb, RbxCt, LL, Wf (Berg 1975)

   Migratory transient: Eb (Berg 1975)

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, marten, river otter, raccoon, white-tailed deer (Constan 1975); pheasants

   Migratory transient: Waterfowl - pintails, shovelers, canvasback, redhead, mallard, gadwall, baldpate, lesser scaup, whistling swan, common merganser, red breasted merganser, common goldeneye, Barrows goldeneye, bufflehead, ruddy duck, blue-wing teal, green-wing teal, cinnamon teal, coot, ring-necked duck, and Canada goose. Nongame - bald eagle, great blue heron (Hook 1975).

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept; streamflow frequency data and current biological data. Flow requests are based on streamflow frequency data at the USGS gaging station "Yellowstone River at Corwin Springs," existing water rights held by the Department of Fish and Game, and flow recommendations for the lower Yellowstone River.

   Biological-streamflow data obtained on the lower Yellowstone River below the Big Horn River are the basis for the flow requests from May 11-August 10. Requested flows in the lower river for this period were based on biological data but approached those flows equaled or exceeded 70% of the time (based on USGS data from 1942-1971). Thus to be consistent with those recommendations, the 70 percent exceedance flows for the Yellowstone River at Corwin Springs (1926-1974) were used as the base flow for the May-August period. However, the Department of Fish and Game has an existing right (see below) in this reach which was subtracted from the base flow to obtain the requested flows. The dominant discharge at the Corwin Springs gage was requested for a 24-hour period.

Existing Rights of the Department of Fish and Game[1/]

From Yellowstone Park boundary to Tom Miner Creek: January 1 - December 31 800 cfs

1/Section 89-801 R.C.M. 1947 - Chapter 345, Laws of 1969. Constitution of the state of Montana; Montana Water Use Act.

8. Why flow is necessary:

Flows are necessary to preserve and maintain fish and wildlife population at current levels in this blue ribbon stream as stated in Section IV "Statement on the Need for the Reservation," and to maintain the physical characteristics of the stream channel through adequate sediment transport and bedload movement.

9. Flow request:

January 1 - May 10, August 11 - December 31: The instantaneous streamflow subject to existing, lawfully appropriated water rights in the stream reach.

	CFS	AC. FT.		CFS	AC. FT.
May 11-20	2900	57,521	July 1-10	5700	113,058
May 21-31	5500	120,000	July 11-20	4000	79,339
June 1-10	7800	154,710	July 21-31	2900	63,273
June 11-20	8700	172,562	Aug. 1-10	2200	43,636
June 21-30	7700	152,727		Total	956,826

Discharge to equal or exceed 15,000 cfs for one continuous 24 hour period between May 11 and Aug. 10 (= 29,752 Ac. Ft.).

Total Ac. Ft. = 986,578 (includes 15,000 cfs for one day).

1. Name: Yellowstone River

2. Stream reach: Tom Miner Creek to Big Creek

3. Location: T7S, R7E, Sec. 30 to T6S, R7E, Sec. 23

4. Fish species present:

   Resident: Ct, Rb, RbxCt, LL, Wf (Berg 1975)

   Migratory transient: Eb (Berg 1975)

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, marten, river otter, raccoon, white-tailed deer (Constan 1975); pheasants

   Migratory transient: Waterfowl - pintail, shoveler, canvasback, redhead, mallard, gadwall, baldpate, lesser scaup, whistling swan, common merganser, red breasted merganser, common goldeneye, Barrows goldeneye, bufflehead, ruddy duck, blue-wing teal, green-wing teal, cinnamon teal, coot, ring-neck duck, and Canada goose. Nongame - bald eagle, great blue heron (Hook 1975).

6. Life history periodicity chart : (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept; streamflow frequency and hydrograph data. Flow requests are based on streamflow frequency data at the USGS gaging station "Yellowstone River at Corwin Springs," existing water rights held by the Department of Fish and Game, and flow recommendations for the lower Yellowstone River.

   Biological-streamflow data obtained on the lower Yellowstone River below the Big Horn River are the basis for the flow requests from May 11-August 10. Requested flows in the lower river for this period were based on biological data but approached those flows equaled or exceeded 70% of the time (based on USGS data from 1942-1971). Thus to be consistent with those recommendations, the 70% exceedance flows for the Yellowstone River at Corwin Springs (1926-1974) were used as the base flow for the May-August period. However, the Department of Fish and Game has an existing right (see below) in this reach which was subtracted from the base flow to obtain the requested flows. The dominant discharge at the Corwin Springs gage was requested for a 24-hour period.

Existing Rights of the Department of Fish and Game[1/]

From Tom Miner Creek to Shields River:	April 16-October 31	2000 cfs
	November 1-April 15	1200 cfs

1/Section 89-801 R.C.M. 1947; Chapter 345, Laws of 1969; Constitution of the state of Montana; Montana Water Use Act.

8. Why flow is necessary:

Flows are necessary to preserve and maintain fish and wildlife populations at current levels in this blue ribbon stream as stated in Section IV "Statement on the Need for the Reservation," and to maintain the physical characteristics of the stream channel through adequate sediment transport and bedload movement.

9. Flow request:

January 1-May 10, August 11-December 31: The instantaneous streamflow, subject to existing, lawfully appropriated water rights in the stream reach.

	CFS	AC. FT.		CFS	AC. FT.
May 11-20	1700	33,719	July 1-10	4500	89,256
May 21-31	4300	93,818	July 11-20	2800	55,537
June 1-10	6600	130,909	July 21-31	2000	43,636
June 11-20	7500	148,760	Aug. 1-10	1000	19,835
June 21-30	6500	128,926			
				Total	744,396

Discharge to equal or exceed 15,000 cfs for one continuous 24-hour period between May 11 and August 10 (= 29,752 Ac. Ft.).

Total Ac. Ft. = 774,148 (includes 15,000 cfs for one day).

1. Name: Yellowstone River

2. Stream reach: Big Creek to Shields River

3. Location: T6S, R7E, Sec. 23 to T1S, R10E, Sec. 26

4. Fish species present:

   Resident: Ct, Rb, RbxCt, LL, Wf (Berg 1975)

   Migratory transient: Eb (Berg 1975)

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, marten, river otter, raccoon, white-tailed deer (Constan 1975); pheasants

   Migratory transient: Waterfowl - pintail, shoveler, canvasback, redhead, mallard, gadwall, baldpate, lesser scaup, whistling swan, common merganser, red-breasted merganser, common goldeneye, Barrows goldeneye, bufflehead, ruddy duck, blue-wing teal, green-wing teal, cinnamon teal, coot, ring-neck duck, and Canada goose. Nongame - bald eagle, great blue heron (Hook 1975).

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept; streamflow frequency data; and current biological data. Flow requests are based on streamflow frequency data at the USGS gaging station "Yellowstone River near Livingston," existing water rights held by the Department of Fish and Game, and flow recommendations for the lower Yellowstone River.

   Biological-streamflow data obtained on the lower Yellowstone River below the Big Horn River are the basis for the flow requests from May 11-August 10. Requested flows in the lower river for this period were based on biological data but approached those flows equaled or exceeded 70% of the time (based on USGS data from 1942-1971). Thus to be consistent with those recommendations, the 70% exceedance flows for the Yellowstone River near Livingston (1901-1967) were used as the base flows for the May-August period. However, the Department of Fish and Game has an existing right (see below) in this reach which was substracted from the base flow to obtain the requested flows. The dominant discharge at the Livingston gage was requested for a 24-hour period.

Existing Rights of the Department of Fish and Game[1/]

From Tom Miner Creek to Shields River:	April 16-October 31	2000 cfs
	November 1-April 15	1200 cfs

1/Section 89-801 R.C.M. 1947; Chapter 345, Laws of 1969; Constitution of the state of Montana; Montana Water Use Act.

8. Why flow is necessary:

Flows are necessary to preserve and maintain fish and wildlife populations at current levels in this blue-ribbon stream as stated in Section IV "Statement on the Need for the Reservation," and to maintain the physical characteristics of the stream channel through adequate sediment transport and bedload movement.

9. Flow request:

January 1-May 10, August 11-December 31: The instantaneous streamflow, subject to existing, lawfully appropriated water rights in the stream reach.

	CFS	AC. FT.		CFS	AC. FT.
May 11-20	1900	37,686	July 1-10	5400	107,107
May 21-31	4700	102,545	July 11-20	3800	75,372
June 1-10	7700	152,727	July 21-31	2500	54,545
June 11-20	9000	178,512	Aug. 1-10	1600	31,736
June 21-30	8000	158,678			
				Total	898,908

Discharge to equal or exceed 18,200 cfs for one continuous 24-hour period between May 11 and August 10 (= 36,099 Ac. Ft.).

Total Ac. Ft. = 935,007 (includes 15,000 cfs for one day).

1. Name: Yellowstone River

2. Stream reach: Shields River to Boulder River

3. Location: T1S, R10E, Sec. 26 to T1N, R14E, Sec. 12

4. Fish species present:

   Resident: Ct, Rb, RbxCt, LL, Wf (Berg 1975)

   Migratory transient: Eb (Berg 1975)

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, marten, river otter, raccoon, white-tailed deer (Constan 1975); pheasant

   Migratory transient: Waterfowl - pintail, shoveler, canvasback, redhead, mallard, gadwall, baldpate, lesser scaup, whistling swan, common merganser, red-breasted merganser, common goldeneye, Barrows goldeneye, bufflehead, ruddy duck, blue-wing teal, green-wing teal, cinnamon teal, coot, ring-neck duck, and Canada goose. Nongame - bald eagle, great blue heron (Hook 1975).

6. Life history periodicity chart: (See Armstrong Spring Creek)

7. Methods used for flow determination:

   Blue ribbon concept; dominant discharge concept; streamflow frequency data and current biological data. Flow requests are based on streamflow frequency data at the USGS gaging stations (1) "Yellowstone River near Livingston" and (2) "Shields River at Clyde Park," existing water rights held by the Department of Fish and Game, and flow recommendations for the lower Yellowstone River.

   Biological-streamflow data obtained on the lower Yellowstone River below the Big Horn River are the basis for the flow requests from May 11-August 10. Requested flows in the lower river for this period were based on biological data but approached those flows equaled or exceeded 70% of the time (based on USGS data from 1942-1971). Thus to be consistent with those recommendations, the 70% exceedance flows for the Yellowstone River, near Livingston plus the 70% exceedance flows for the Shields River at Clyde Park were used as the base flow for the May-August period. However, the Department of Fish and Game has an existing right (see below) in this reach which was subtracted from the base flow to obtain the requested flows. The dominant discharge at the Livingston gage was requested for a 24-hour period.

Existing Rights of the Department of Fish and Game[1/]

From Shields River to Boulder River:	April 16-October 31	2000 cfs
	November 1-April 15	1200 cfs

1/Section 89-801 R.C.M. 1947, Chapter 345; Laws of 1969; Constitution of the state of Montana; Montana Water Use Act.

8. Why flow is necessary:

Flows are necessary to preserve and maintain fish and wildlife populations at current levels in this blue ribbon stream as stated in Section IV "Statement on the Need for the Reservation," and to maintain the physical characteristics of the stream channel through adequate sediment transport and bedload movement.

9. Flow request:

January 1-May 10, August 11-December 31: The instantaneous streamflow, subject to existing, lawfully appropriated water rights in the stream reach.

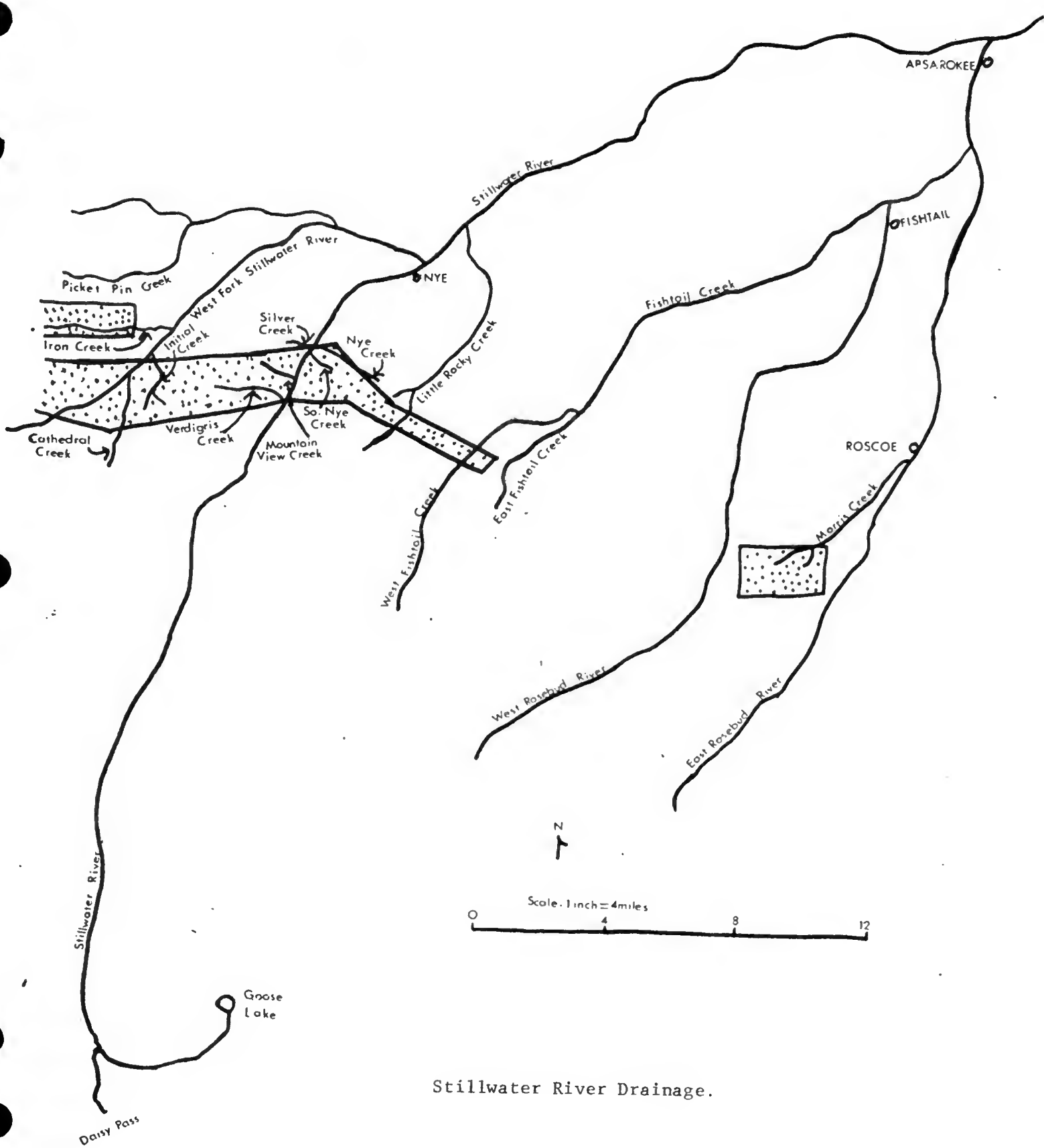
	CFS	AC. FT.		CFS	AC. FT.
May 11-20	2200	43,636	July 1-10	5500	109,091
May 21-31	4900	106,909	July 11-20	3800	75,372
June 1-10	8000	158,678	July 21-31	2500	54,545
June 11-20	9300	184,463	Aug. 1-10	1600	31,736
June 21-30	7200	142,810			
				Total	907,240

Discharge to equal or exceed 18,200 cfs for one continuous 24-hour period between May 11 and August 10 (= 36,099 Ac. Ft.).

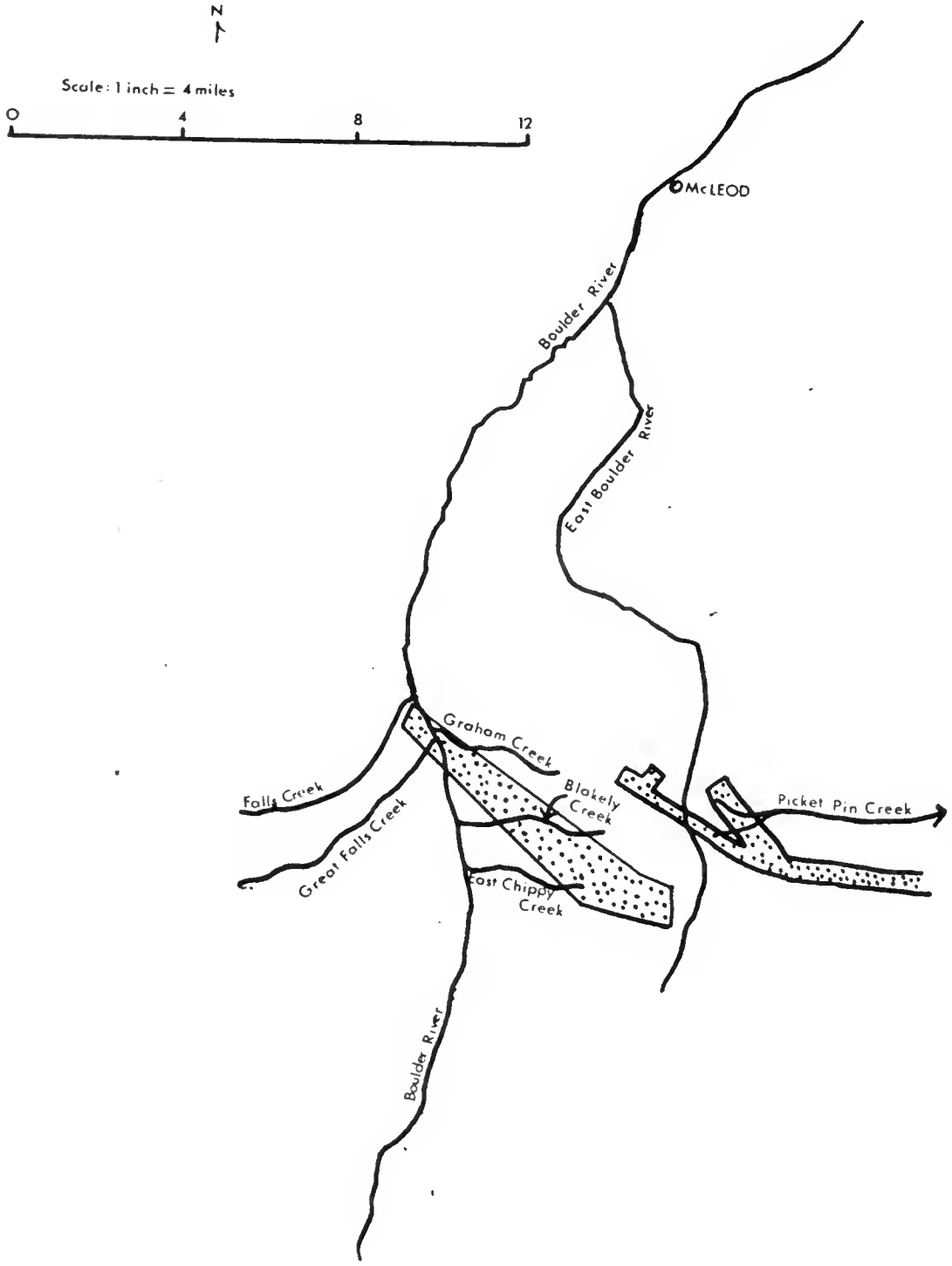
Total Ac. Ft. = 943,339 (includes 15,000 cfs for one day).

MIDDLE YELLOWSTONE BASIN

Boulder River to Big Horn River



Stillwater River Drainage.



Boulder River Drainage.

Mid-Big Timber Creek

Gallatin National Forest boundary to confluence with Swamp Creek

T3N, R13E, Sec. 6, 7, 18, 19, 30 to T2N, R14E, Sec. 27A
T2N, R12E, Sec. 36

Game fish species present:
- Rainbow trout (Salmo gairdneri)
- Brown trout (Salmo trutta)
- Brook trout (Salvenlinus fontinalis)
- Mountain whitefish (Prosopium williamsoni)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Racoon (Procyon lotor)

Methods:
- Water discharge measurements and photographs
- Professional judgment
- Fisheries data collections
- Historic flow data - U. S. Geological Survey

Flow request:

	Jan	Feb	Mar	April	May	June	July 1-20	July 21-31	Aug	Sept	Oct	Nov	Dec
cfs	10	10	10	20	85	180	100	30	30	20	15	10	10
AF	615	555	615	1,190	5,226	10,711	3,967	655	1,845	1,190	922	595	615

Total AF 28,701

This reservation of flow request is necessary to maintain a portion of the existing fish and aquatic life. Without at least this request for minimum flows, the system will not have sufficient water exchange to maintain water quality necessary to sustain trout populations. These flows are below optimum fishing levels and considerably below other water-based recreational opportunities. Photographs at various discharge values and 10 years of occasional observations suggest that esthetics are best at flows of 50 to 75 cfs. Fishermen interviews revealed that they feel optimum fishing during August and September occurs at flows around 40 to 50 cfs.

A small amount of electrofishing in a 300-foot section reemphasized the importance of undercut banks and overhanging vegetation. At 13 cfs only the outside of each meander contained these critical habitat types. An occasional debris pile of logs and brush resulting from high flows constituted the remaining trout habitat. Whitefish occupied only pool areas. Juvenile trout used shoal areas over 1½ inches in depth; as flows are reduced this nursery habitat diminishes rapidly because of the substrate character. Due to unstable flows and associated stream channel disturbance, the substrate is mostly cobbles which do not allow continuity of shoal water adjacent to main channel flows. Juveniles were observed in isolated shallow pools within the shoal cobbles. These fish are assumed to be consumed by predators and/or die due to lack of adequate dissolved oxygen and high temperatures.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Mid-Big Timber Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Rainbow trout												
Passage												
Spawning					———	———	———					
Incubation					———	———	———	———	———	(First ½)		
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———						———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Eastern brook trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———						———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Mountain whitefish												
Passage												
Spawning									———	———	———	
Incubation	———	———	———	———	———				———	———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
———												
Passage												
Spawning												
Incubation												
Rearing												
———												
Nest Establishment												
Incubation												

Lower Big Timber Creek

Swamp Creek to Yellowstone River

T2N, R14E, Sec. 27 to T1N, R14E, Sec. 12

Game fish species present:
Brown trout (Salmo trutta)
Mountain whitefish (Prosopium williamsoni)

Riparian wildlife species present:
Beaver (Castor canadensis)
Muskrat (Ondatra zibethicus)
Mink (Mustela vison)
Raccoon (Procyon lotor)

Methods:
Water Surface Profile
Water discharge and photographs
U.S.G.S. discharge measurements upstream

Flow request:

	Jan	Feb	Mar	Apr	May	June	July 1-20	July 21-31	Aug	Sept	Oct	Nov	Dec
cfs	10	10	10	20	85	180	100	30	30	20	13	10	10
AF	615	555	615	1,190	5,226	10,711	3,967	655	655	1,190	922	595	615

Total AF 28,701

Lower Big Timber Creek is an extremely erratic environment. Extreme flows occur during freshet and occasionally during heavy rains falling on the east edge of the Crazy Mountains. During the irrigating season flows sometimes approach zero. Thus its difficult to request flows for trout regardless of the methodology in arriving at flow values. Flow measurements, occasional observations of this stretch and specific data collections on nearby Sweet Grass Creek prompted the above request.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Lower Big Timber Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	———					———		———
Rearing	———											
Mountain whitefish												
Passage												
Spawning									———	———	———	
Incubation	———	———	———	———	———				———	———	———	———
Rearing	———											
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Upper Bluewater Creek

Headwaters to Bluewater Springs Trout Hatchery

T7S, R24E, Sec. 2B to T6S, R24E, Sec. 9B

Game fish species present:
Brown trout (Salmo trutta)

Riparian wildlife species present:
Beaver (Castor canadensis)
Mink (Mustela vison)
Muskrat (Ondatra zibethicus)
Racoon (Procyon lotor)

Methods:
Water discharge measurements and photographs
Fisheries data collections, production study, known age study
Sediment investigations
Professional judgment
Aquatic insect study
Flow duration curves

Flow request:

	Jan	Feb	Mar	Apr	May	June	June	Aug	Sept	Oct	Nov	Dec
cfs	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
AF	584	528	584	565	584	565	584	584	565	584	565	584

Total AF 6,878

The entire Bluewater Creek has been studied intensively for 15 years. Studies were both biological and physical investigations. It was demonstrated in several cases the detrimental effects of sediment, relationship of both high and low flows with sediment transport and deposition. The requested flows for this reach are essential to maintain trout embryo survival. They are below the amount of water presently in the system and that utilized by agriculture. Lesser flows in this reach would have considerable impact downstream. Less flows would lessen flows downstream, cause fines to settle out and ultimately force downstream brown trout to occupy only the upper 5 miles of Bluewater Creek. At present, brown trout exist in 10 miles of the 13-mile stream. Lower limits are due to low flows, silt deposition, and increased temperature.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Upper Bluewater Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning												
Incubation						(1st week)						
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Nest Establishment												
Incubation												

Middle Bluewater Creek

Bluewater Springs Trout Hatchery effluent to McDowell Coulee

T6S, R24E, Sec. 9B to T6S, R24E, Sec. 6C

Game fish species present:
- Brown trout (Salmo trutta)
- Rainbow trout (Salmo gairdneri)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Raccoon (Procyon lotor)

Methods:
- Water discharge measurements and photographs
- Fisheries data collections (numerous studies)
- Sediment investigations
- Professional judgement
- Flow duration curves
- Aquatic insect studies

Flow request:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
cfs	26	26	26	26	26	26	26	26	26	26	26	26
AF	1,599	1,444	1,599	1,547	1,599	1,547	1,599	1,599	1,547	1,599	1,547	1,599

Total AF 18,823

Flow data for ten years (1960-1970) reveal the great stability (28 cfs) in stream discharge in this reach. Later measurements show increased volumes 35+ cfs due to additional water from Bluewater Springs Trout Hatchery. The requested flows above are well below the lowest measured flows and are necessary to maintain existing trout egg survival, nursery areas, bank cover, feeding stations and adequate temperature regimes. The request flows are adequate to intra-gravel oxygen supplies, apparent velocity and cleasing of intra-gravel sediments. Lesser flows would cause more sediment deposition and indirectly reduce the fishery. It has also been demonstrated that increased sediment deposition increases the opportunity for rough fish species with greater tolerances. Thus more suckers and less brown trout. A discharge of 26 cfs allows for existing water needs and still provides for trout needs.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Middle Bluewater Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning												
Incubation					(1st week)							
Rearing												
Rainbow trout												
Passage												
Spawning												
Incubation												
Rearing									(2nd week)			
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Lower Bluewater Creek

McDowell Coulee to mouth at Yellowstone River

T6S, R24E, Sec. 6C to T5S, R23E, Sec. 21B

Game fish species present:
Brown trout (Salmo trutta)

Riparian wildlife species present:
Beaver (Castor canadensis)
Muskrat (Ondatra zibethicus)
Racoon (Procyon lotor)
Mink (Mustela vison)

Methods:
Water discharge measurements and photographs
Fishing data collection
Sediment studies
Professional judgment
Flow duration curves

Flow request:

	Jan	Feb	Mar	Apr	May	June	June	Aug	Sept	Oct	Nov	Dec
cfs	20	20	20	20	20	20	20	20	20	20	20	20
AF	1,230	1,111	1,230	1,190	1,230	1,190	1,230	1,230	1,190	1,230	1,190	1,230

Total AF 14,479

Lower Bluewater Creek is subject to less stability due to irrigation removal and waste water returns. Brown trout comprise the entire trout fishery. Recent efforts to increase this fish species distribution are keyed to maintaining adequate flows (see upper and lower Bluewater Creek requests). The largest trout found in Bluewater Creek occupy this mid-lower reach, but these fish must shift upstream when flows become low, water temperatures warm and rough fish densities become large enough to create serious competition for food. The above request is necessary to maintain brown trout and still allow water uses above present levels.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Lower Bluewater Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning												
Incubation					(1st week)							
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Nest Establishment												
Incubation												

Bridger Creek

Headwaters to Krone Ditch headgate

T3S, R15E, Sec. 9B to T1S, R16E, Sec. 36C

Game fish species present:
- Cutthroat trout (Salmo clarki)
- Rainbow trout (Salmo gairdneri)
- Brown trout (Salmo trutta)
- Brook trout (Salvelinus fontinalis)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Racoon (Procyon lotor)

Methods:
- Water discharge measurements and photograph
- Professional judgment
- Fisheries data collections and creel census

Flow request:

	Jan	Feb	Mar	Apr	May		June	July	Aug	Sept	Oct	Nov	Dec
					1-20	21-31							
cfs	3	3	3	3	3	15	15	4	4	3	3	3	3
AF	184	167	184	178	119	327	893	246	246	178	184	178	184

Total AF - 3,268

Bridger Creek has extreme flow levels from dry, downstream near Interstate 90, to nearly 3,000 cfs during heavy runoffs. Esthetics are best when the channel has 10 to 20 cfs in the upper and middle reaches. The lower reach has no esthetic value due to wide, gravel-laden channel. Fishermen that were interviewed during late July and August said fishing was best when flows were between 10 and 20 cfs; however, these flows were rare. Irrigation utilizes considerable water and even though our 4 cfs request is inadequate for maximum public enjoyment or optimum fish biomass, it represents existing leftover water.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Bridger Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cutthroat trout												
Passage												
Spawning					———	———						
Incubation					———	———	———	———				
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Rainbow trout												
Passage												
Spawning					———	———						
Incubation					———	———	———	———				
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	——— (First ½)						———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Eastern brook trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	——— (First ½)						———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
———												
Passage												
Spawning												
Incubation												
Rearing												
———												
Nest Establishment												
Incubation												

1. Stream name: Boulder River - Sweet Grass County

2. Stream reach: Mouth to mouth of West Boulder River

3. Location: T1N, R14E, Sec 12 to T2S, R13E, Sec. 15

4. Fish species present:

   Resident: Brown and rainbow trout; mountain whitefish; various cyprinids
   Migratory: none significant

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: none significant

6. Life history periodicity chart: attached

7. Methods used for flow determination: USGS flow data; low flow photography; extrapolation of fish population and life history data from an adjacent reach of the river.

8. Why flow is necessary: Flows requested will help maintain fish population and riparian wildlife in their present condition. Flows for November through April were derived by extending water surface profile data obtained on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish population. Flows for May through October are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	80	80	80	80	300	1690	565	185	195	200	80	80	
Ac.Ft	4919	4443	4919	4760	18631	100562	34740	11375	11603	12359	4760	4919	217,990

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Boulder River from mouth to mouth of West Boulder River

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown Trout												
Passage												
Spawning											------	
Incubation	------	------	------								------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Rainbow Trout												
Passage												
Spawning				------	------							
Incubation				------	------	------						
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Nest Establishment												
Incubation												

1. Stream name: Boulder River - Sweet Grass and Park Counties

2. Stream reach: Mouth of West Boulder River to mouth of Falls Creek

3. Location: T2S, R13E, Sec. 15 to T4S, R12E, Sec. 15

4. Fish species present:

   Resident: Brook, brown, and rainbow trout; various cyprinids
   Migratory transient: None

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: None significant

6. Life history periodicity chart: attached.

7. Methods used for flow determination: USGS flow data; low flow photography; fish population and life history data obtained by electrofishing.

8. Why flow is necessary: Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows for November through April were derived by extending water surface profile data obtained on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow requested to maintain the existing fish populations. Flow for May through October are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	50	50	50	50	150	1080	480	200	145	115	50	50	
Ac.Ft.	3074	2777	3074	2975	9223	64264	29514	12298	8628	7071	2975	3074	148,947

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Boulder River from mouth to West Boulder River to mouth of Falls Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brook Trout												
Passage										- - -		
Spawning											- - -	- - -
Incubation	- - -	- - -	- - -									
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Brown Trout												
Passage											- - -	
Spawning												- - -
Incubation	- - -	- - -	- - -	- - -								
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Rainbow Trout												
Passage												
Spawning				- - -	- - -							
Incubation				- - -	- - -	- - -	- - -					
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

1. Stream name: Boulder River - Sweet Grass County

2. Stream reach: Mouth of Falls Creek to mouth of Hawley Creek

3. Location: T4S, R12E, Sec. 15 to T5S, R12E, Sec. 35

4. Fish species present:

   Resident: Brook, cutthroat, and rainbow trout; longnose dace
   Migratory transient: None

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: None significant

6. Life history periodicity chart: attached.

7. Methods used for flow determination: USGS flow data; fish population and life history data obtained by electrofishing.

8. Why flow is necessary: Flows requested will help maintain fish population and riparian wildlife in their present condition. Flows for November through April were derived by extending water surface profile data obtained on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish population. Flows for May through October are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow Request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	40	40	40	40	75	540	240	101	72	56	40	40	
Ac.Ft.	2460	2221	2460	2380	4612	32132	14757	6210	4284	3443	2380	2460	79,799

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Boulder River from mouth of Falls Creek to mouth of Hawley Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brook Trout												
Passage												
Spawning										------		
Incubation	------	------	----							------	------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Rainbow Trout												
Passage												
Spawning				------	------							
Incubation				------	------	------	---					
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Cutthroat Trout												
Passage												
Spawning				------	------							
Incubation				------	------	------	---					
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Upper Butcher Creek

Headwaters to and including West Butcher Creek

T7S, R18E, Sec. 8C to T6S, R18E, Sec. 1D

Game fish species present:
Brown trout (Salmo trutta)
Brook trout (Salvelinus fontinalis)

Riparian wildlife species present:
Beaver (Castor canadensis)
Muskrat (Ondatra zibethicus)
Mink (Mustela vison)
Racoon (Procyon lotor)

Methods:
Professional judgment
Fisheries data collected
Stream survey and discharge measurements

Flow request:

	Jan	Feb	Mar	Apr	May		June	July	Aug	Sept	Oct	Nov	Dec
					1-20	21-31							
cfs	5	5	5	5	5	5	5	5	5	5	5	5	5
AF	307	278	307	298	198	109	298	307	307	298	307	298	307

Total AF - 3,620

Upper Butcher Creek includes the sum of the tributaries before most flows are consolidated into one channel. Most fishing recreation in this reach exists in 7 miles of West Butcher and 8 miles of Butcher Creek including a portion of East and West Forks. Most fishing pressure is from local residents during early summer. Flows requested are basically maintenance flows and are below optimum conditions.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Upper Butcher Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning												
Incubation					(2nd week)							
Rearing												
Eastern brook trout												
Passage												
Spawning												
Incubation					(2nd week)							
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Lower Butcher Creek

From confluence with West Butcher Creek to mouth

T6S, R18E, Sec. 1D to T4S, R18E, Sec. 13B

Game fish species present:
Brown trout (Salmo trutta)
Brook trout (Salvelinus fontinalis)

Riparian wildlife species present:
Beaver (Castor canadensis)
Muskrat (Ondatra zibethicus)
Mink (Mustela vison)
Raccoon (Procyon lotor)

Methods:
Water Surface Profile
Water discharge measurements and photographs
Professional judgement
Fisheries data collections
Physical measurements of depths, overhanging vegetation and undercut banks

Flow request:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
cfs	10	10	10	15	25	40	40	40	15	15	10	10
AF	615	555	615	893	1,537	2,380	2,460	2,460	893	922	595	615

Total AF 14,540

According to results of water surface profile data, physical losses below 15 cfs would reduce existing trout population numbers. The wetted perimeter would be reduced 13% from 25 to 10 cfs, depths would be reduced 36%, and widths 13% at these flow regimens. Habitat, overhanging vegetation would be reduced 32% and undercut banks would be reduced 75% from less than optimum 20 cfs and undesirable 10 cfs. Based on water surface profiles and physical measurements (data on file in Red Lodge, MT), the above request seems a minimal requirement for the existing fishery.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Lower Butcher Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning					(2nd week)							
Incubation												
Rearing												
Eastern brook trout												
Passage												
Spawning					(2nd week)							
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

1. Stream name: Castle Creek - Stillwater county

2. Stream reach: From mouth to mouth of Lodgepole Creek

3. Location: T4S, R15E, Sec. 26 to T4S, R15E, Sec. 28

4. Fish species present:

   Resident: Brown trout
   Migratory transient: None

5. Riparian wildlife present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: Bald eagle

6. Life history periodicity chart: attached

7. Methods used for flow determination: Water surface profile program; USGS flow data, Montana Fish and Game gaging data; low flow photography; spawning redd velocity measurements; fish population and life history data obtained by electrofishing.

8. Why flow is necessary: On the basis of adult fish habitat, and inundation of backwater young-of-year pools, 15 cfs was determined as the minimum desirable low flow. Flows for May through October are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance. Data indicate that 20 cfs is a minimum desirable flow for brown trout spawning in November.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	15	15	15	15	25	60	30	22	22	20	20	15	
Ac.Ft.	922	833	922	893	1537	3570	1845	1353	1309	1230	1190	922	16,526

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Castle Creek from mouth to mouth of Lodgepole Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown Trout Passage Spawning Incubation Rearing												
Passage Spawning Incubation Rearing												
Passage Spawning Incubation Rearing												
Passage Spawning Incubation Rearing												
Passage Spawning Incubation Rearing												
Nest Establishment Incubation												

1. Stream name: Castle Creek - Stillwater County

2. Stream reach: From mouth of Lodgepole Creek to mouth of Picket Pin Creek

3. Location: T4S, R15E, Sec. 28 to T4S, R15E, Sec. 30

4. Fish species present:

   Resident: Brown trout
   Migratory transient: none

5. Riparian wildlife species present:

   Resident: Beaver, mink, muskrat, racoon
   Migratory transient: bald eagle

6. Life history periodicity chart: attached

7. Methods used for flow determination: Water surface profile program, Montana Fish and Game gaging data; low flow photography; spawning redd velocity measurements; fish population and life history data obtained by electro-fishing.

8. Why flow is necessary: On the baiss of cover available for adult fish, required spawning velocities, and inundation of backwater, young-of-year pools, 8 cfs was determined as the minimum desirable flow. Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows for May through October are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	8	8	8	8	10	40	20	12	10	9	8	8	
Ac.Ft.	492	444	492	476	615	2380	1230	738	595	553	476	492	8983

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Castle Creek from mouth of Lodgepole Creek to mouth of Picket Pin Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown Trout												
Passage												
Spawning											- - -	
Incubation	- - -	- - -	- - -	- - -							- - -	- - -
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
________												
Passage												
Spawning												
Incubation												
Rearing												
________												
Passage												
Spawning												
Incubation												
Rearing												
________												
Passage												
Spawning												
Incubation												
Rearing												
________												
Passage												
Spawning												
Incubation												
Rearing												
________												
Nest Establishment												
Incubation												

1. Stream name: Castle Creek - Stillwater and Sweet Grass Counties

2. Stream reach: From mouth of Picket Pin Creek and upstream for a distance of 1500 stream feet.

3. Location: T4S, R15E, Sec. 30 to T4S, R14E, Sec. 25

4. Fish species present

   Resident: Brook and brown trout
   Migratory transient: none

5. Riparian wildlife species present:

   Resident: muskrat, mink
   Migratory transient: bald eagle

6. Life history periodicity chart: attached

7. Methods used for flow determination: Stream gaging by Montana Department of Fish and Game and USFS low flow photography; fish population and life history data obtained by electrofishing; spawning redd velocity measurements.

8. Why flow is necessary: Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows in October and November are required for spawning. Flows for November through April were chosen from studies on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish populations. Flows for May through October are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	1	1	1	1	2	8	5	3	2	2	1	1	
Ac.Ft.	61	56	61	60	123	476	307	184	119	123	60	61	1691

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Castle Creek from mouth of Picket Pin Creek and upstream for a distance of 1500 stream feet.

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brook Trout												
Passage												
Spawning										- - -		
Incubation	- - -									- - -	- - -	- - -
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Brown Trout												
Passage												
Spawning											- - -	
Incubation	- - -	- - -	- - -								- - -	- - -
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Clarks Fork Yellowstone River

Montana-Wyoming line to Bluewater Creek

T7S, R22E, Sec. 31C to T3S, R23E, Sec. 20A

Game fish species present:
- Cutthroat trout (Salmo clarki)
- Rainbow trout (Salmo gairdneri)
- Brown trout (Salmo trutta)
- Mountain whitefish (Prosopium williamsoni)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Raccoon (Procyon lotor)
- Otter (Lutra canadensis)

Methods:
- Water Surface Profile
- Water discharge measurements
- Professional judgement
- Fisheries data collections

Flow request:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
cfs	160	150	150	200	1,100	2,900	1,400	450	250	200	200	175
AF	9,838	8,330	9,223	11,900	67,636	172,561	86,082	13,950	14,876	12,297	11,900	10,760

Total AF 429,353

The above flow recommendations are 60% of mean monthly discharges measured at the USGS gage near the state line. The area of maximum concern for fisheries is from the state line to Belfry, Montana. The entire river is important to riparian wildlife, waterfowl and birds of prey.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Upper Clarks Fork Yellowstone River

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Yellowstone Cutthroat												
Passage												
Spawning									(1st week)			
Incubation												
Rearing												
Rainbow trout												
Passage												
Spawning									(1st week)			
Incubation												
Rearing												
Brown trout												
Passage												
Spawning					(2nd week)							
Incubation												
Rearing												
Mountain Whitefish												
Passage												
Spawning				(1st week)								
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment Incubation												

Lower Clarks Fork Yellowstone River

Bluewater Creek to mouth

T3S, R23E, Sec. 20A to T2S, R24E, Sec. 24B

Game fish species present:
- Brown trout (Salmo trutta)
- Mountain whitefish (Prosopium williamsoni)
- Sauger (Stizostedion canadense)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Raccoon (Procyon lotor)
- Otter (Lutra canadensis)

Methods:
- Water discharge measurements
- Professional judgement
- Fisheries data collections

Flow request:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
cfs	250	240	240	390	1,070	2,900	1,400	470	400	400	330	260
AF	15,371	13,329	14,757	23,207	65,792	172,562	86,083	28,899	23,802	24,595	19,636	15,987

Total AF 504,020

The above request is 60 percent of mean monthly discharges at USGS gage station near the confluence with Rock Creek near Rockvale, Montana. This section of river is important for flow maintenance in the lower Yellowstone River and fish and wildlife in the whole system.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Lower Clarks Fork Yellowstone River

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning					(2nd week)							
Incubation												
Rearing												
Mountain Whitefish												
Passage												
Spawning				(1st week)								
Incubation												
Rearing												
Sauger												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Clear Creek

Headwaters to mouth

T7S, R20E, Sec. 25B to T5S, R21E, Sec. 28B

Game fish species present:
- Rainbow trout (Salmo gairdneri)
- Brown trout (Salmo trutta)
- Brook trout (Salvelinus fontinalis)
- Mountain whitefish (Prosopium williamsoni)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Raccoon (Procyon lotor)

Methods:
- Water Surface Profile
- Water discharge measurements and photographs
- Professional judgement
- Fisheries data collection

Flow request:

	Jan	Feb	Mar	Apr	May 1-20	May 21-31	June	July 1-20	July 21-31	Aug	Sept	Oct	Nov	Dec
cfs	15	15	15	15	15	30	30	30	20	20	20	20	18	15
AF	922	833	922	893	595	655	1,785	1,190	436	1,230	1,190	1,230	1,071	922

Total AF 13,874

Over the last 11 years, Clear Creek has been studied for numerous biological characteristics. These studies (data on file with Pat Marcuson, Red Lodge, Montana) in combination with flow measurements and water surface profile results led to the above request. Flows reduced from 20 cfs to 10 cfs cause a net loss of 24% wetted perimeter, 10% loss of width 30% loss of depth and 42% loss of nursery area (water to 1½ inches in depth). Fisherman indicate a preference of 20 to 30 cfs when flows are clear and this same range appears ideal for good esthetic quality. Clear creek generates mostly from springs during winter months and therefore could be a quality fish environment without man-caused abuses. Surface runoff and water diversion from Rock Creek constitute spring and summer flows. The above request considers only the accummulation of springs for winter months.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Clear Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Rainbow trout												
Passage												
Spawning						———	———					
Incubation						———	———	———	(1st week)			
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	(2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Eastern brook trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	(2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Mountain whitefish												
Passage												
Spawning									———	———	———	
Incubation	———	———	———	(1st week)					———	———	———	———
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Dry Creek

Headwaters to mouth at Rock Creek

T6S, R20E, Sec. 22, 26 to T5S, R21E, Sec. 9D

Game fish species present
Brown trout (Salmo trutta)
Brook trout (Salvelinus fontinalis)

Riparian wildlife species present:
Beaver (Castor canadensis)
Muskrat (Ondatra zibethicus)
Mink (Mustela vison)
Racoon (Procyon lotor)

Methods:
Professional judgment
Creel census

Flow request:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
cfs	2	2	2	2	2	2	2	2	2	2	2	2
AF	123	111	123	119	123	119	123	123	119	123	119	123

Total AF - 1,448

Two cubic feet per second will maintain the existing fishery. Discharges range from occasional flows of 4 cfs during peak irrigation periods to 65 cfs during freshet. Obviously more fish would be possible with more flows. Fishermen from Billings and nearby Roberts enjoy Dry Creek and many consider fishing excellent for small brook and brown trout.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Dry Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———						———		———
Rearing	———											———
Brook trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———						———		———
Rearing	———											———
———												
Passage												
Spawning												
Incubation												
Rearing												
———												
Passage												
Spawning												
Incubation												
Rearing												
———												
Passage												
Spawning												
Incubation												
Rearing												
———												
Nest Establishment												
Incubation												

1. Stream: East Boulder River - Sweet Grass County

2. Stream reach: From mouth to mouth of Dry Fork Creek

3. Location: T2S, R13E, Sec. 33 to T4S, R13E, Sec. 11

4. Fish species present:

   Resident: Brown and rainbow trout
   Migratory transient: none

5. Wildlife species present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: none significant

6. Life history periodicity chart: attached

7. Methods used for flow determination: USGS flow data; Montana Fish and Game flow data, low flow photography, fish population and life history data obtained by electrofishing.

8. Why flow is necessary: Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows for November through April were derived by extending water surface profile data obtained on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish populations. Flows for May through October are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	15	15	15	15	20	165	50	22	20	18	15	15	
Ac.Ft.	922	833	922	893	1230	9818	3074	1353	1190	1107	893	922	23,157

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section East Boulder River from mouth to mouth of Dry Fork Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown Trout												
Passage												
Spawning											------	
Incubation	------	------	------	------							------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Rainbow Trout												
Passage												
Spawning				------	------							
Incubation				------	------	------	------					
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

1. Stream: East Boulder River - Sweet Grass County

2. Stream reach: Mouth of Dry Fork to mouth of Brownlee Creek

3. Location: T4S, R13E, Sec. 11 to T4S, R13E, Sec. 26

4. Fish species present:

   Resident: Brown, rainbow and rainbow-cutthroat hybrid trout
   Migratory transient: none

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, mink
   Migratory transient: none significant

6. Life history periodicity chart: attached

7. Methods used for flow determination: USGS flow data; fish population and life history data obtained by electrofishing.

8. Why flow is necessary: Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows for November through April were chosen from studies on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish populations. Flows for May through October are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	10	10	10	10	14	120	36	16	14	13	10	10	
Ac.ft.	615	555	615	595	861	7140	2214	984	833	799	595	615	16,421

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section East Boulder River from mouth of Dry Fork to mouth of Brownlee Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown Trout												
Passage												
Spawning											------	
Incubation	------	------	------	------							------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Rainbow Trout												
Passage												
Spawning					------	------						
Incubation					------	------	------	------				
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

1. Stream name: Fishtail Creek - Stillwater County

2. Stream reach: From confluence of East and West Fishtail Creeks to mouth

3. Location: T5S, R17E, Sec. 19 to T4S, R18E, Sec. 28

4. Fish species present:

   Resident: brown and rainbow trout, mountain whitefish
   Migratory transient: None significant

5. Riparian wildlife species present:

   Resident: Beaver, Muskrat, mink, racoon
   Migratory transient: none significant

6. Life history periodicity chart: attached

7. Methods used for flow determination: Low flow stream gaging by Montana Fish and Game; low flow photography; correlation of flow with a nearby USGS gage; fish population and life history data obtained by electro-fishing.

8. Why flow is necessary: Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows for August through April are the approximate average annual minimum. They were derived by extending water surface profile data obtained on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish populations. Flows from May through July were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	10	10	10	10	14	24	14	10	10	10	10	10	
Ac.Ft.	615	555	615	595	860	1428	860	615	595	615	595	615	8,563

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Fishtail Creek from confluence of East and West Fishtail creeks to mout

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown Trout												
Passage												
Spawning											------	
Incubation	------	------	------	------							------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Rainbow Trout												
Passage												
Spawning				------	------							
Incubation				------	------	------	------					
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

1. Stream name: East Fishtail Creek - Stillwater County

2. Stream reach: From junction with West Fishtail Creek to mouth of East Fork of East Fishtail Creek

3. Location: T5S, R17E, Sec. 19 to T5S, R16E, Sec. 26

4. Fish species present:

   Resident: Brook, brown and rainbow trout
   Migratory transient: none

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: none significant

6. Life history periodicity chart: attached

7. Methods used for flow determination: Low flow stream gaging by Montana Fish and Game; low flow photography; correlation of low flow with a nearby USGS gage; fish population and life history data obtained by electrofishing.

8. Why flow is necessary: Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows for August through April are the approximate average annual minimum. They were derived by extending water surface profile data obtained on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish populations. Flows for May through July were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	4	4	4	4	7	12	7	4	4	4	4	4	
Ac.Ft.	246	222	246	238	430	714	430	246	238	246	238	246	3,740

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section East Fishtail Creek from junction with West Fishtail Creek to mouth of East Fork of East Fishtail creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brook Trout												
Passage										- - -		
Spawning												
Incubation	- - -	- - -	- - -							- - -	- - -	- - -
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Brown Trout												
Passage												
Spawning											- - -	
Incubation	- - -	- - -	- - -	- - -							- - -	- - -
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Rainbow Trout												
Passage												
Spawning					- - -	- - -						
Incubation					- - -	- - -	- - -					
Rearing	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

1. Stream name: West Fishtail Creek - Stillwater County

2. Stream reach: From junction with East Fishtail Creek to the Richman-Kennedy ditch headgate

3. Location: T5S, R17E, Sec. 19 to T5S, R16E, Sec. 27

4. Fish species present:

   Resident: Brook, brown and rainbow trout
   Migratory transient: none

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: none significant

6. Life history periodicity chart: attached

7. Methods used for flow determination: Low flow stream gaging by Montana Fish and Game, low flow photography; correlation of low flow with a nearby USGS gage; fish population and life history data obtained by electrofishing.

8. Why flow is necessary: Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows for August through April are the approximate average annual minimum. They were derived by extending water surface profile data obtained on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish populations. Flows for May through July were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	4	4	4	4	10	20	10	4	4	4	4	4	
Ac.Ft.	246	222	246	238	615	1190	615	246	238	246	238	246	4,586

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section West Fishtail Creek from junction with East Fishtail Creek to the Richman-Kennedy ditch headgate

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brook Trout												
Passage										------		
Spawning												
Incubation	------	------	----							------	------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Brown Trout												
Passage												
Spawning											------	
Incubation	------	------	------	----							------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Rainbow Trout												
Passage												
Spawning					------	----						
Incubation					------	------	------					
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

1. Stream name: Little Rocky Creek - Stillwater County

2. Stream reach: from Mouth upstream to crossing of Forest Service Rd. 1414

3. Location: T4S, R16E, Sec. 28 to T5S, R16E, Sec. 21

4. Fish species present:

   Resident: Brown and cutthroat trout; longnose sucker; longnose dace
   Migratory transient: none significant

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: none significant

6. Life history periodicity chart: attached

7. Methods used for flow determination: Spot flow measurements made by USGS and Montana Fish and Game; low flow photography; correlation of low flows with nearby USGS gage; fish population and life history data obtained by electrofishing.

8. Why flow is necessary: Flows requested will help maintain fish populations and riparian wildlife in their present condition. Flows for August through April are the approximate average annual minimum. They were derived by extending water surface profile data obtained on nearby similar streams where it was found that typical natural flows in this period were near the minimum flow required to maintain the existing fish populations. Flows for May through July were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	4	4	4	4	6	8	6	4	4	4	4	4	
Ac.Ft.	246	222	246	238	369	476	369	246	238	246	238	246	3,380

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Little Rocky Creek from mouth upstream to crossing of Forest Service Rd. 1414

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown Trout												
Passage												
Spawning											------	
Incubation	------	------	------	---							------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Cutthroat Trout												
Passage												
Spawning				------	------							
Incubation				---	------	------	------					
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Lower Deer Creek

Headwaters to Interstate 90

T4S, R1E, Sec. 4 to T1S, R16E, Sec. 6C

Game fish species present:
- Brown trout (Salmo trutta)
- Rainbow trout (Salmo gairdneri)
- Brook trout (Salvelinus fontinalis)
- Cutthroat trout (Salmo clarki)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Raccoon (Procyon lotor)

Methods:
- Water Surface Profile
- Water discharge measurements and photographs
- Professional judgement
- Fish data collections

Flow request:

	Jan	Feb	Mar	Apr	May 1-20	May 21-31	June	July	Aug	Sept	Oct	Nov	Dec
cfs	5	5	5	5	5	25	25	8	8	5	5	5	5
AF	307	278	307	298	198	545	1,488	492	492	298	307	298	307

Total AF 5,615

Extreme fluctuations of flows presently exist in Lower Deer Creek drainage. Water rarely flows through the stream channel from Interstate 90 to the Yellowstone River during the summer. Large gravel deposits and irrigation needs eliminate and/or cause flows to disappear underground. The upper reach is an excellent fishing stream in an esthetically pleasing environment. Headwater reaches contain small numbers of indigenous cutthroat trout whose existence is dependent on adequate flows of quality water.

Water surface profile records suggest that at least 10 cfs is necessary to maintain adequate nursery areas, cover, depths and velocities. Other observations and measurement suggest that the flows requested above are more realistic with the present irrigation needs.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Lower Deer Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Yellowstone cutthroat												
Passage												
Spawning						———	———					
Incubation						———	———	———	(1st week)			
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Rainbow trout												
Passage												
Spawning						———	———					
Incubation						———	———	———	(1st week)			
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	(2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Eastern broon trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	(2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
———												
Passage												
Spawning												
Incubation												
Rearing												
———												
Nest Establishment												
Incubation												

1. Stream name; Picket Pin Creek - Stillwater and Sweet Grass Counties

2. Stream reach: from mouth to mouth of Swamp Creek

3. Location: T4S, R15E, Sec 30 to T4S, R14E, Sec. 25

4. Fish species present:

   Resident: Brook, Brown and Cutthroat trout
   Migratory transient: none

5. Riparian wildlife species present:

   Resident: Beaver, muskrat, mink, racoon
   Migratory transient: bald eagle

6. Life history periodicity chart: attached

7. Methods used for flow determination: Water surface profile program; Montana Fish and Game and USGS gaging data, low flow photography; fish population and life history data obtained by electrofishing, spawning redd velocity measurements.

8. Why flow is necessary: Flows requested will help maintain fish populations in their present condition. On the basis of cover available for adult fish and backwater pools for young-of-year fish 5 cfs was determined as minimum desirable flow. These flows are also suitable for riparian wildlife. Flows for June and July are approximate average monthly minimum flows. They were chosen to insure a semblance of natural flows for channel flushing and maintenance.

9. Flow request:

	J	F	M	A	M	J	J	A	S	O	N	D	Total
CFS	5	5	5	5	7	25	10	8	6	6	5	5	
Ac.ft.	307	278	307	298	430	1488	615	492	357	369	298	307	5546

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Picket Pin Creek from mouth to mouth of Swamp Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brook Trout												
Passage												
Spawning										------		
Incubation	------	------								------	------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Brown Trout												
Passage												
Spawning											------	
Incubation	------	------	------								------	------
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Cutthroat Trout												
Passage												
Spawning					------							
Incubation					------	------	------					
Rearing	------	------	------	------	------	------	------	------	------	------	------	------
Passage												
Spawning												
Incubation												
Rearing												
Passage												
Spawning												
Incubation												
Rearing												
Nest Establishment												
Incubation												

Mid Red Lodge Creek

Custer National Forest Service boundary to confluence with East and West Red Lodge Creeks

T7S, R18E, Sec. 1 to T6S, R20E, Sec. 7

Game fish species present:
- Brown trout (Salmo trutta)
- Rainbow trout (Salmo gairdneri)
- Brook trout (Salvelinus fontinalis)
- Mountain whitefish (Prosopium williamsoni)
- Cutthroat trout (Salmo clarki)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Raccoon (Procyon lotor)

Methods:
- Water discharge measurements
- Professional judgements
- Fisheries data collections
- Measurements of channel parameters

Flow request:

	Jan	Feb	Mar	Apr	May 1-20	May 21-31	June	July 1-20	July 21-31	Aug	Sept	Oct	Nov	Dec
cfs	10	10	10	10	10	25	25	25	20	20	15	10	10	10
AF	614.9	560	614.9	595	396.7	545.4	1,487.6	495.9	545.5	1,229.8	892.6	614.9	595	614.9

Total AF 9,803

This section of Red Lodge Creek provides a varied and excellent fishing recreational area. Considerable fisheries investigations (Job Progress Report F-20-R-21 Job Ia Supplement) provide the basis for the above flow request. Tributaries are included with hopes the requested flows will exist in the entire system but no less than 10 cfs at their confluence T6S, R20E, Sec. 7B.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Red Lodge Creek (Mid)

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage										—	—	
Spawning										—	—	—
Incubation	—	—	—	—								
Rearing	—	—	—	—	—	—	—	—	—	—	—	—
Eastern brook trout												
Passage										—	—	
Spawning										—	—	—
Incubation	—	—	—	—								
Rearing	—	—	—	—	—	—	—	—	—	—	—	—
Rainbow trout												
Passage												
Spawning						—			(1st week)			
Incubation						—	—	—	—			
Rearing	—	—	—	—	—	—	—	—	—	—	—	—
Cutthroat trout												
Passage												
Spawning						—			(1st week)			
Incubation						—	—	—	—			
Rearing	—	—	—	—	—	—	—	—	—	—	—	—
Mountain whitefish												
Passage												
Spawning									—	—	—	
Incubation	—	—	—	—	—				—	—	—	—
Rearing	—	—	—	—	—	—	—	—	—	—	—	—
Nest Establishment Incubation												

Lower Red Lodge Creek

Confluence of East and West Red Lodge Creek to Cooney Reservoir

T6S, R20E, Sec. 7 to T4S, R20E, Sec. 34

Game fish species present:
- Brown trout (Salmo trutta)
- Rainbow trout (Salmo gairdneri)
- Brook trout (Salvelinus fontinalis)
- Mountain whitefish (Prosopium williamsoni)
- Cutthroat trout (Salmo clarki)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Raccoon (Procyon lotor)

Methods:
- Water discharge measurements and photographs
- Professional judgements
- Fisheries data collections
- Water Surface Profiles

Flow request:

	Jan	Feb	Mar	Apr	May 1-20	May 21-31	June	July 1-10	July 21-31	Aug	Sept	Oct	Nov	Dec
cfs	40	40	40	40	40	60	100	100	50	25	50	50	45	40
AF	2459.5	2241.3	2459.5	2380.2	1586.8	1309	5950	1983	2083	1537	2975	3074	2678	2460

Total AF 35,175

Lower Red Lodge Creek is a popular fishing spot. Its a stream with lots of potential but is already subject to considerable flow alterations during irrigation season. It is not unusual to find a dry or unmeasurable stream discharge between headgates while agricultural needs are greatest. This greatest need occurs between hay cuttings which is usually around the second week of August. Mean flows for nine years of record are: October - April 59 cfs, May-June 217 cfs, and July-September 72 cfs. Local fishermen suggest that their preferred water depths depended upon fishing methods. Fly fishermen preferred 50 to 70 cfs while bait fishermen liked lots of water but not so high to be turbid. Esthetics is best at or above 75 cfs; these flows cover silt bars and exposed cobble substrate. The requested flows above are below optimum but are considered adequate to maintain a fishery at present fishing levels. Lower flows plus more fishermen would mandate higher cost at reduced fishing quality to provide fishing recreation.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Red Lodge Creek (lower)

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brown trout												
Passage												
Spawning										—	—	
Incubation	—	—	—	—						—	—	—
Rearing	—											—
Eastern brook trout												
Passage												
Spawning										—	—	
Incubation	—	—	—	—						—	—	—
Rearing	—											—
Rainbow trout												
Passage												
Spawning					—	—						
Incubation					—	—	—	—				
Rearing	—											—
Mountain whitefish												
Passage												
Spawning										—	—	
Incubation	—	—	—	—						—	—	—
Rearing	—											—
Cutthroat trout												
Passage												
Spawning		No reproduction in this reach										
Incubation												
Rearing	—											—
Nest Establishment												
Incubation												

Rock Creek

Montana-Wyoming line to confluence with West Fork Rock Creek

T9S, R18E, Sec. 35A to T8S, R20E, Sec. 4D

Game fish species present:
- Cutthroat trout (Salmo clarki)
- Rainbow trout (Salmo gairdneri)
- Brook trout (Salvelinus fontinalis)
- Brown trout (Salmo trutta)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)

Methods:
- Water discharge measurements and photographs
- Professional judgements
- Fisheries data collections
- Rock Creek Floodplain Study
- Drainage inventory of streams and lakes

Flow request:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
cfs	15	15	15	15	45	220	220	135	70	44	25	20
AF	922	833	922	893	2,767	1,309	1,353	8,301	4,165	2,705	1,488	1,230

Total AF 26,888

Rock Creek system generates from Beartooth Mountains in the Custer National Forest. The Rock Creek Water User Association has an impoundment at Glacier Lake near the headwaters of Rock Creek proper. A U.S.G.S. discharge station is located above the confluence with West Fork Rock Creek. The flows requested above are based on discharge measurements existing during winter low flow periods and numerous measurements near Roberts, Montana. Minimum values are 60% of mean monthly flows for nine years of USGS records.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Rock Creek (Upper)

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Yellowstone cutthroat												
Passage												
Spawning						———	———					
Incubation						———	———	———	(1st week)			
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Rainbow trout												
Passage												
Spawning						———	———					
Incubation						———	———	———	(1st week)			
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	(2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Brook trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	(2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Mid Rock Creek

Confluence of West Fork Rock Creek to Bailey Ditch

T8S, R20E, Sec. 04D to T7S, R20E, Sec. 11C

Game fish species present:
- Cutthroat trout (Salmo clarki)
- Rainbow trout (Salmo gairdneri)
- Brook trout (Salvelinus fontinalis)
- Brown trout (Salmo trutta)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Raccoon (Procyon lotor)

Methods:
- Water discharge measurements and photographs
- Professional judgement
- Fisheries data collections
- Rock Creek Floodplain Studies
- Drainage inventory of streams and lakes

Flow request:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
cfs	25	25	20	20	60	295	295	170	80	55	35	25
AF	1,537	1,388	1,230	1,190	3,689	17,553	18,139	10,453	4,760	3,382	2,083	1,537

Total AF 66,941

This is the section of Rock Creek flowing through Red Lodge, Montana to the first major diversion. This reach contains a variety of trout species. The lower reach is dominated by fall spawning brown and brook trout. Maintenance of spring and summer flows is critical to the welfare of spring spawning rainbow and cutthroat trout. The above flow requests were based on USGS discharge measurements. Minimum values are 60% of mean monthly flows.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Mid Rock Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Yellowstone cutthroat												
Passage												
Spawning						———	———					
Incubation						———	———	———	——— (1st week)			
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Rainbow trout												
Passage												
Spawning						———	———					
Incubation						———	———	———	——— (1st week)			
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	——— (2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Eastern brook trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	——— (2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
_____												
Passage												
Spawning												
Incubation												
Rearing												
_____												
Nest Establishment												
Incubation												

Lower Rock Creek

Bailey Ditch to mouth

T7S, R20E, Sec. 11C to T3S, R23E, Sec. 36D

Game fish species present:
- Rainbow trout (Salmo gairdneri)
- Brown trout (Salmo trutta)
- Brook trout (Salvelinus fontinalis)
- Mountain whitefish (Prosopium williamsoni)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Racoon (Procyon lotor)

Methods:
- Water surface profiles
- Water discharge measurements and photographs
- Professional judgment
- Fisheries data collections
- Rock Creek Floodplain Studies

Flow request:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
cfs	30	30	30	25	65	375	310	95	50	40	35	35
AF	1,845	1,666	1,845	1,488	3,997	22,314	19,061	5,841	2,975	2,460	2,083	2,152

Total AF - 67,677

Lower Rock Creek is subject to intensive water withdraws during the irrigating seaso The lower drainage also has numerous tributaries adding flows. The reach of stream has excellent brown trout populations where the stream channel is unaltered; however, few of these areas exist. Many of the abuse areas have densities of 150 pounds per surface acre No spring spawning fish species exist, probably due to lack of water over redds during incubation periods. Brown trout and brook trout spawn during low flow periods and are self-sustaining. Fishing success is highest when flows are between 75 and 100 cfs for fly fishermen and 100 to 200 cfs for bait and lure fishing. Esthetics are best when flow are clear and cover the substrate from bank to bank. This requires 150 to 200 cfs. Discharge measurements during the Rock Creek Floodplain Study and during summer of 1976 were multiplied by .60 and are listed by month for the request.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Lower Rock Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Rainbow trout												
Passage												
Spawning						———	———					
Incubation						———	———	———	——— (1st week)			
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Brown trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	——— (2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Eastern brook trout												
Passage												
Spawning										———	———	
Incubation	———	———	———	———	——— (2nd week)					———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
Mountain whitefish												
Passage												
Spawning									———	———	———	
Incubation	———	———	———	——— (1st week)					———	———	———	———
Rearing	———	———	———	———	———	———	———	———	———	———	———	———
———												
Passage												
Spawning												
Incubation												
Rearing												
———												
Nest Establishment												
Incubation												

Lower East Rosebud Creek

Custer National Forest boundary to confluence with West Rosebud Creek

T6S, R18E, Sec. 31B to T4S, R18E, Sec. 13C

Game fish species present:
- Cutthroat trout (Salmo clarki)
- Brown trout (Salmo trutta)
- Rainbow trout (Salmo gairdneri)
- Brook trout (Salvelinus fontinalis)
- Mountain whitefish (Prosopium williamsoni)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Racoon (Procyon lotor)

Methods:
- Water surface profile
- Water discharge measurements and photographs
- Fish data collections
- Drainage stream and lake survey

Flow request:

	Jan	Feb	Mar	Apr	May		June	July		Aug	Sept	Oct	Nov	Dec
					1-20	21-31		1-20	21-31					
cfs	60	60	60	60	50	50	200	200	200	150	80	60	60	60
AF	3,698	3,332	3,698	3,570	1,983	1,091	1,190	7,934	4,364	9,223	4,760	3,698	3,570	3,698

Total AF 55,809

Another important and heavily used stream in the Yellowstone River system is this reach of East Rosebud Creek. It's hard to imagine anything less than existing flows. The request, however, is based on water surface profile data, measurements of tributary discharges and the varied fishery. Fishermen indicate that they prefer depths which are realized between 100 and 125 cfs. Esthetic values are always good at present flow regimens, but are super when bank full, 300+ cfs. Floaters enjoy the meandering valley from the Custer National Forest to the Sand Ford bridge. Measurements of flows during August and September were lowest at 125 cfs and were usually in the 190 to 225 cfs range. The above flow request is felt to be the minimum to sustain the fishery.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Lower East Rosebud Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Yellowstone Cutthroat												
Passage												
Spawning									(1st week)			
Incubation												
Rearing												
Rainbow trout												
Passage												
Spawning									(1st week)			
Incubation												
Rearing												
Brown trout												
Passage												
Spawning												
Incubation					(2nd week)							
Rearing												
Eastern brook trout												
Passage												
Spawning												
Incubation					(2nd week)							
Rearing												
Mountain Whitefish												
Passage												
Spawning												
Incubation				(1st week)								
Rearing												
Nest Establishment												
Incubation												

West Rosebud Creek

Mystic Lake to confluence with Fiddler Creek

T7S, R16E, Sec. 9 & 16 to T5S, R17E, Sec. 23D

Game fish species present:
- Cutthroat trout (Salmo clarki)
- Rainbow trout (Salmo gairdneri)
- Brown trout (Salmo trutta)
- Brook trout (Salvelinus fontinalis)
- Mountain whitefish (Prosopium williamsoni)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Racoon (Procyon lotor)

Methods:
- Water discharge measurements (U. S. Geological Survey flow records)
- Professional judgments
- Fisheries data collected
- Drainage inventory of streams and lakes

Flow request:

	Jan	Feb	Mar	Apr	May 1-20	May 21-31	June	July	Aug	Sept	Oct	Nov	Dec
cfs	50	50	50	40	40	100	150	200	150	90	50	50	50
AF	3,074	2,777	3,074	2,380	1,587	2,182	8,926	12,298	9,223	3,570	3,074	2,975	3,074

Total AF - 58,214

Discharge of West Rosebud Creek below Mystic Lake is partially controlled by Montana Power Company. On the basis of 9 years of flow records, water surface profiles and fish data collections generated the above request. Physical values suffer greatest losses below 100 cfs. Esthetics are best when depths cover bottom substrates and water is contiguous with each bank; this would require at least 200 cfs. Fishermen prefer 50 to 75 cfs in the upper reaches and 75 to 200 cfs in lower reaches. The values requested above are slightly above mean monthly flows; however, this request includes Chicken, Line, Black Can, Cold, Fiddler and several unnamed tributaries. The mean yearly contribution of water not presently used for agriculture is approximately 46 cfs. The request is aimed at stream discharge in West Rosebud Creek at an including Fiddler Creek.

LIFE CYCLE PERIODICITY CHART

Name of stream or stream section Upper West Rosebud Creek

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Yellowstone Cutthroat												
Passage												
Spawning									(1st week)			
Incubation												
Rearing												
Rainbow trout												
Passage												
Spawning									(1st week)			
Incubation												
Rearing												
Brown trout												
Passage												
Spawning												
Incubation					(2nd week)							
Rearing												
Eastern brook trout												
Passage												
Spawning												
Incubation					(2nd week)							
Rearing												
Mountain Whitefish												
Passage												
Spawning												
Incubation				(1st week)								
Rearing												
Nest Establishment												
Incubation												

Lower West Rosebud Creek

Confluence with Fiddler Creek to mouth

T5S, R17E, Sec. 23D to T4S, R18E, Sec. 13C

Game fish species present:
- Cutthroat trout (Salmo clarki)
- Rainbow trout (Salmo gairdneri)
- Brown trout (Salmo trutta)
- Brook trout (Salvelinus fontinalis)
- Mountain whitefish (Prosopium williamsoni)

Riparian wildlife species present:
- Beaver (Castor canadensis)
- Muskrat (Ondatra zibethicus)
- Mink (Mustela vison)
- Racoon (Procyon lotor)

Methods:
- Water surface profile
- Water discharge measurements and photographs
- Professional judgment
- Fisheries data collections

Flow request:

	Jan	Feb	Mar	Apr	May 1-20	May 21-31	June	July	Aug	Sept	Oct	Nov	Dec
cfs	65	65	65	50	50	130	195	260	145	120	65	65	65
AF	3,997	3,610	2,997	2,975	1,983	2,836	1,160	15,987	11,990	1,140	3,997	3,868	3,997

Total AF - 61,537

Lower West Rosebud Creek has several small tributary streams below the U. S. Geological Survey gauge station at Mystic Lake. Most of the above monthly requests are below the mean monthly discharges 32 miles upstream at the gauge station. Water surface profile suggests that many physical features are lost below 100 cfs. This is an important stream in the Yellowstone River system in that it produces considerable fishing and water-based recreation for many people. It also provides need of quality water downstream in Stillwater and Yellowstone Rivers.